EIS G4™
Powered by RTMS®

RTMS™ G4 USER MANUAL

Remote Traffic Microwave Sensor

visionary solutions

image sensing systems
canada limited

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Chapter 1
About the G4 System

Revision History

Revisions to this document are as follows:

Issue No.	Issue Date	Issue Reason
Issue 5.0	May 2008	First issue of G4 product.
Issue 5.1	July 2008	New screenshots and organization. Corrected information pertaining to G4.
Issue 5.2	December 2008	New documentation formation. New information. Corrections.
Issue 5.3	February 2009	New documentation formation. New information. Corrections.

Warranty

Image Sensing Systems Inc. warrants this product to be free from defects in material and workmanship for a period of two years from date of delivery. Damage to the product due to accident, abuse by the buyer, or unauthorized modification, improper installation, or operation outside the specifications is not covered by the warranty.

Image Sensing Systems, Inc. warrants that its software and firmware designated for use with the instrument will execute its programming instructions when properly installed. ISS does not warrant that operation of software or firmware will be uninterrupted or error free.

CAUTION

Do not attempt to repair the RTMS unit. Such action will void the warranty. Contact ISS Canada if the unit requires servicing.

Service

If your hardware or software fails to operate, please refer to the troubleshooting guides provided with this documentation or call ISS technical support.

ISS Inc. will repair or replace at its option, any components, which prove to be defective during the warranty period.

- Buyer shall pay for shipping charges to ISS.
- ISS will pay shipping charges and insurance for warranty repaired product.
- Buyer will be invoiced for repair and shipping of product repaired outside of warranty or when no fault is found.

Units returned to ISS for service should include the following information with the shipment:

- Name, address, and contact information of owner.
- Name and telephone number of someone familiar with the problem who may be contacted by ISS personnel for further information if necessary.
- Model number, serial number and software revision number.
- A complete description of the problem. For example:
  - Under what conditions did the problem occur?
  - What equipment was attached?
  - What was the result of the Self Test diagnostic?
- Shipping address for the return.
- Return Merchandise Authorization number. Contact ISS Customer Support prior to shipping merchandise to obtain it.

The unit should be shipped in the original container. If the original container is unavailable, there should be approximately one inch of packing material between the unit and inner carton. For example: use plastic bubble-wrap. The carton should be sealed with strong tape or strapping.

Prerequisites

If you are installing RTMS G4 hardware you must perform the following tasks:

- Choose an appropriate installation location.
- Manage your own personal safety and safety of other personnel.
- Assemble a list of the required equipment.
- Have experience creating cables.

If you are using the WinRTMS software you must perform the following tasks:

- Operate a mouse.
- Operate a keyboard.
- Start Windows.
- Install new software.
- Save and open file using Windows common file dialog.

Important Safety Information

Please review the following information before installation.

Warning

- READ ALL INSTRUCTIONS BEFORE USING
- HEED ALL WARNINGS IN THESE INSTRUCTIONS
- SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

RTMS units must be installed and adjusted in accordance with the installation instructions contained in this manual. Use the RTMS only for its intended purposes as described in this manual. Changes or modifications not expressly approved by ISS Canada Ltd. could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the

Note FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense.

Contact ISS Canada

Please contact ISS Canada with any questions or concerns about the RTMS or other ISS Canada products, toll free at 1-800-668-9385. More information about our complete product line is available on the web at www.imagesensingca.com.

Brief Description

The RTMS (Remote Traffic Microwave Sensor) measures the distance to objects in the path of its microwave beam. This ranging capability allows it to detect moving and stationary vehicles in multiple detection zones.

A single sensor can monitor traffic in up to 8-12 lanes. The sensor can be mounted on road-side poles and aimed at a right angle to the road; this is referred to as the *side-fired* configuration.

The internal processor calculates volume, occupancy, average speed and vehicle classifications for each lane and transmits the information using its data ports and communication interfaces. Optional contact closure outputs are also available for compatibility with loop based systems.

Caution

- For optimal accuracy, ISS Canada strongly recommends using ISS Canada-trained personnel to install all RTMS-related products.
- ISS Canada also strongly recommends using ISS Canada-trained personnel to survey installation sites for all RTMS-related products.
- For more information about our installation, surveying, and training programs, contact ISS Canada at 1-800-668-9385.

Warning

Consult ISS Canada before using the RTMS or other RTMS-related products for any purpose not expressly described in this manual or any other RTMS product manual. Do not use the RTMS to control or operate a gate-opening mechanism. Use of the RTMS for any unauthorized purpose may cause injury to personnel or damage to equipment.

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Scope of This Document

This documentation provides the following information for RTMS G4 sensor model K4:

- Setup
- Operation
- Troubleshooting

Software documentation for the RTMS Setup Utility 4.0 (also referred to as WinRTMS) is also provided here.

- RTMS Setup Utility version 4.0 or greater is required for setup of RTMS G4 units with firmware version 7.1 and later.
- This software is backwards compatible with all previous RTMS versions.
- Backward compatibility with older firmware is provided through WinRTMS version 3.6.

Inspect Your Shipment from ISS Canada

Please verify your RTMS shipment contains the following items:

- The RTMS sensor with lynch pin.
- Ball-joint mounting bracket; the vertical style is shipped by default; a horizontal style is available on request.
- Connector kit consisting of :
  - MS connector, female crimp pins, backshell, and pin insertion/extraction tool.
  - DB-9F connector, female crimp pins and backshell.
  - RJ-45 jack, if ordered with TCP/IP option.
- RTMS Setup Utility Software on CD.
- Whip antenna, if equipped with an internal modem (indicated by a label).
- **Please notify ISS Canada immediately if the contents are incomplete or if there is physical damage to any items in the shipment**.
- Call toll free at 1-800-668-9385 or contact ISS Canada on the web at www.imagesensingca.com.

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RTMS Options

The standard RTMS G4 Model K4 offers the following:

- K-band (24.125 GHz)
- Low Voltage Power 12-24V AC or DC
- 8MB Internal Data Storage Memory
- RS-232/485 Serial Interfaces

RTMS may be ordered with the following data communication options:

- Bluetooth Setup Wireless Interface
- Additional RS-232/422 Serial Interface
- Integrated Digital Spread Spectrum (DSS) Transceiver
- Integrated Cellular Modem: CDMA/GPRS/WiFi
- Integrated TCP/IP Ethernet Interface
- Integrated NTCIP 1209 Communications Protocol Module
- Integrated IP Video Camera
- Contact Closure for 8 and 16 Zones

The following power options are available:

- 115V AC

Introduction to the RTMS

The RTMS G4 (Remote Traffic Microwave Sensor — 4th Generation) is a true RADAR device, designed for traffic sensing applications. It measures the distance to objects in the path of its microwave beam. The ranging capability allows the RTMS to detect stationary and moving vehicles in multiple detection zones. When pointed onto a roadway, the RTMS microwave beam projects an oval footprint. Its range is divided into multiple micro-slices, in which vehicles are detected.

The RTMS receives reflected signals from all surfaces within its beam—pavement, barriers, vehicles and trees. It maintains a background signal level from fixed objects in each micro-slice. Vehicles are detected when their reflected signal exceeds the background level in their micro-slice by a certain threshold level. If that detection is part of a defined zone, its contact (optional) is closed during the detection time to indicate detection and internal counters are incremented. Statistical measurements are available through two ports, including optional IP and Radio modems.

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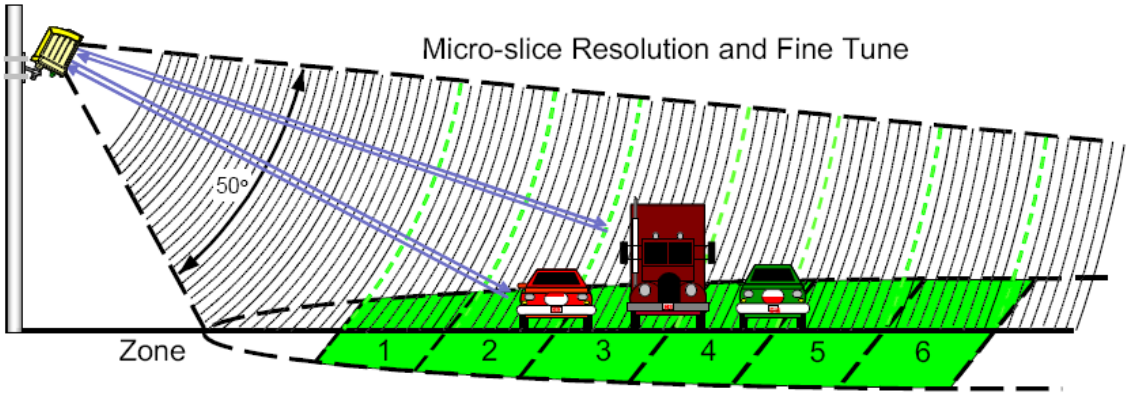

Figure 1.1. RTMS Microwave and Beam Footprint

Several operating modes optimize internal parameter settings for highway and intersection applications. Two mounting configurations are possible: *side-fired* and *forward-looking*.

In *side-fired* mounting:

- The RTMS is located on a roadside pole and is aimed perpendicular to the traffic lanes.
- Micro-slices corresponding to the location of traffic lanes are allocated as detection zones during the setup process.
- Each detection zone consists of multiple micro-slices.
- The length of the detection zone is determined by the width of the beam's footprint.

In *forward-looking* mounting:

- The RTMS is mounted on an overhead structure and is aimed along the center of the lane.
- In highway applications the sensor's aiming angle is adjusted to confine the footprint to one or two lanes.
- The RTMS accurately measures vehicle speed and travel direction.

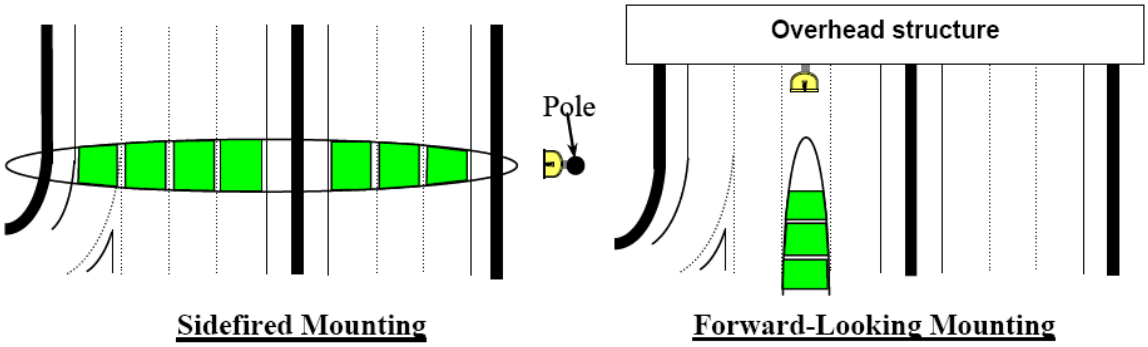

Figure 1.2. RTMS Mounting Configurations

Vehicle Detection

RTMS technology allows accuracy in the following conditions, even with a relatively low mounting-height:

- Severe weather.
- Strong vibrations common to roadways that carry large vehicles.
- When vehicles are completely occluded by other vehicles.

Chapter 2
RTMS G4 Installation

Side-Fired Mounting and Aiming

The distance between the close edge of the first lane of traffic to be monitored and the front of the structure on which the RTMS is mounted is referred to as *set-back*. Set-back is a limiting installation parameter of RTMS. More lanes can be covered with a larger set-back.

Use the diagrams in Figures 2.1, 2.2, and 2.3 to determine the setback required to monitor a given number of lanes. The correct installation height can be determined once the set-back is calculated. Height is measured relative to the road surface of the detection area. Do not measure height from the bottom of the mounting pole.

Example: For 3 lanes the minimum set-back should be 5 feet [1.5m].

Note

It is almost always better to be 20 feet [6 m] further back from the minimum than 2 inches [5 cm] closer than the minimum. If real estate is available, move the RTMS further back.

The mounting height is based on the setback. Using the correct height value allows the RTMS to be aimed so that it receives maximum return signal while covering all required lanes. Mounting the RTMS at an incorrect height will reduce accuracy.

Median strips are equivalent to lanes and must be included in total lane count. For example: an eight lane road with a two lane-wide median strip has 10 equivalent lanes.

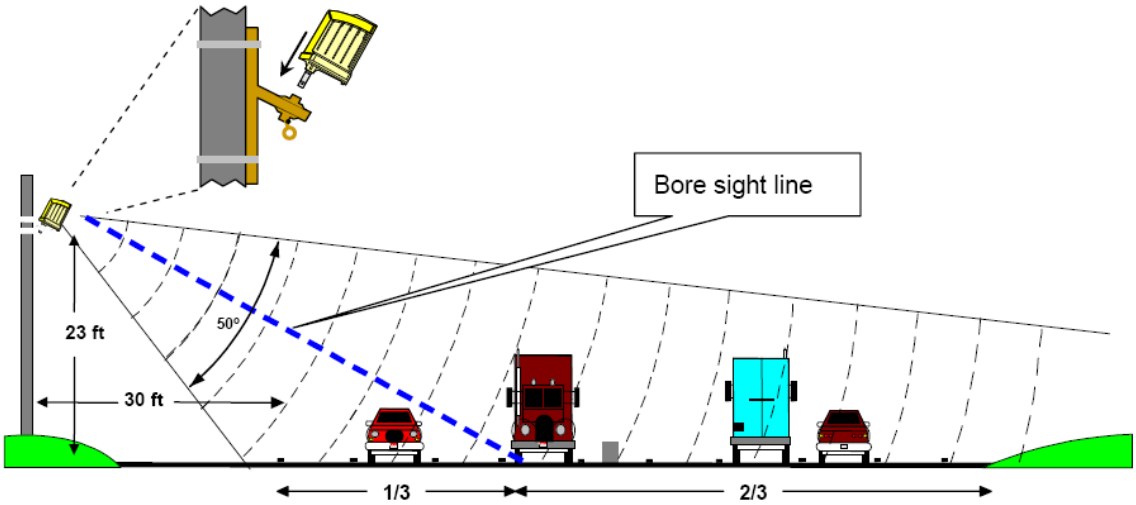

Figure 2.1. RTMS Aiming

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Mounting and Aiming Procedure

Warning

Installation ISS Canada hardware may require that you work above the ground on a ladder or bucket truck. Please make sure you have all the required equipment and are aware of potential safety issues before starting any installation. DO NOT install any RTMS hardware if you are unsure how to complete the installation or lack appropriate safety equipment. ISS Canada does not recommend installing this hardware during inclement weather.

The following equipment is required to mount and aim the RTMS unit:

- *Provided By ISS Canada*. RTMS unit and its housing.
- *Not Provided*. Bolts or stainless steel banding. The bolt specifications depend on the mounting requirements: for example, different bolts may be required when the RTMS unit is mounted on a wooden pole than when the RTMS unit is mounted on a concrete wall.
- *Provided By ISS Canada*. Lynch pin
- *Not Provided*. 7/16" wrench, 1/2" wrench, assorted tools to be determined by mounting specifications.

To mount and aim the RTMS unit:

1. Attach the bracket to the roadside pole (or another specified location) using bolts or stainless steel banding.
2. Secure the RTMS to the mounting bracket by inserting the lynch pin.
3. Aim the RTMS as indicated on the diagram above. A 7/16" wrench is required to release/tighten the ball-joint bolt.
4. Adjust the RTMS to be perpendicular to the travel lanes and level side to side.
5. Look from behind the unit and use the top sight-ridge as a guide to align the bore sight.
6. Tilt so that the top of the RTMS is aimed to the first 1/3 of the monitored lanes.
7. Secure the position by tightening the bolt.

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Set-Back Height Diagrams

Total width is the distance from edge of the first lane to the outside edge of the last lane. Divide this number by the average lane width. For most applications, 12 feet is considered a typical lane width. Example: total detection area = 120 feet; lane = 12 feet; 120/12 = 10 equivalent lanes.

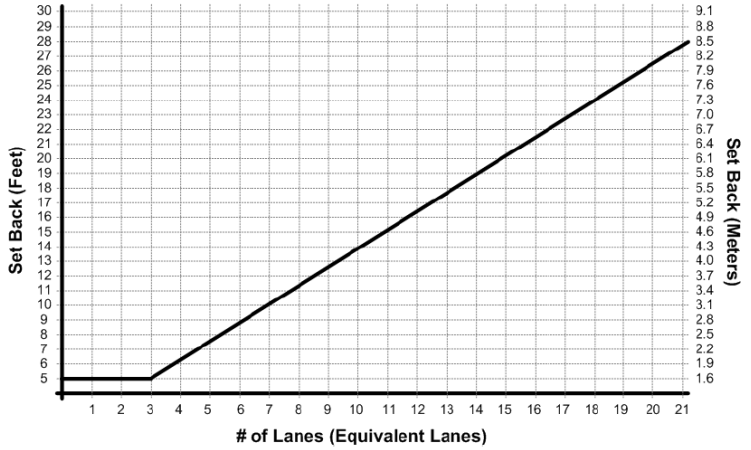

Figure 2.2. Set-Back Distance Chart

Increase the setback as much as possible if room is available. Then obtain the proper mounting height based upon actual set-back distance.

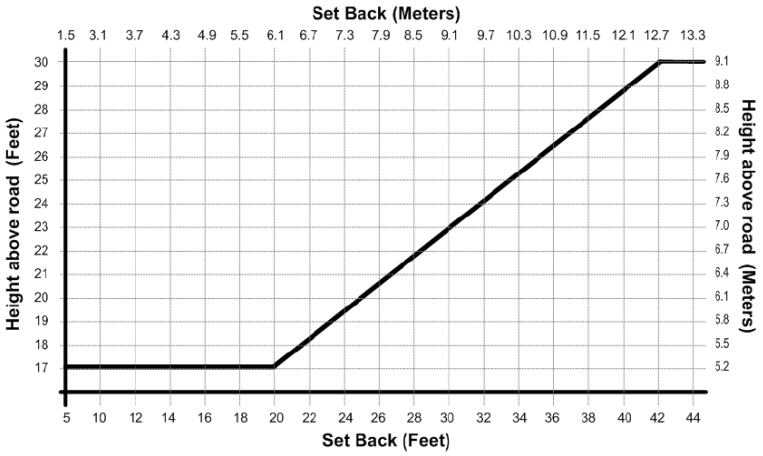

Figure 2.3. Mounting Height Chart.

Zero Setback Options

Current generation hardware/software has new features that enable the RTMS sensor to work with zero setback. For example: zero setback might be required for installation on a bridge. However, appropriate setback distance should always be used when setback is available.

- The zero setback feature has a maximum range of ~50 feet or 4 lanes of traffic.
- Recommended mounting height is 14 feet.

Cabling

Surge Suppression

Each RTMS unit has built-in surge-suppression hardware. Please keep in mind the following:

- ISS Canada recommends installing external surge-suppression devices with every detector.
- The communication and power lines of the RTMS should be equipped with external surge-suppression devices when long cable runs are required.
- Install surge-suppression devices close to the sensor. For example, in a cabling cabinet mounted on the pole below the RTMS.

See Recommended Surge Protection for further details on installing surge-suppression devices.

The RTMS Cable

The RTMS ships with all required connectors, crimp pins, and back-shells.

- RTMS G4 units (same as earlier RTMS models) use a single 32-pin MS connector for power and communications.
- The RTMS cable should be made from 20 or 22 gauge stranded wire arranged in twisted pairs.
- Cables exposed to outdoor conditions should be UV shielded.

The number of pairs required depends on the communication options chosen:

Table 2.1. Cable Pair Requirements

Communication Options	Number Of Pairs
Standard RS232/485 plus power	5
Standard RS232/485 and Internal RF modem option plus power	5
RS232/485 and TCP/IP plus power	7
RS232/485 and second serial port RS232/422 plus power	7
Zone contact option added to any of the above:	Add 1 wire per zone for each option. Option 1 (Maximum 16 contacts) Option 2 (Maximum 8 isolated contacts)

Preparing a Cable

Use cable such as the Belden number 95xx (xx indicates number of pairs. For example: 9516 is a 6-pair cable). In preparing a cable note the following:

- Decide whether or not to install extra cable pairs for growth purposes.
- The crimp pins are designed for stranded wire only.
- **Do not use cable employing solid wires**.
- ISS suggests the Daniels Manufacturing Corporation crimping tool M22520/1-01 AF8 with head number M22520/1-02 or equivalent.
- **Do not solder crimp pins!**

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Connecting a Cable to the RTMS

Use the following procedure to connect a cable to the RTMS device:

1. Thread cable through the backshell before inserting pins into shell.
2. Use the insertion tool (red) to insert wires with crimped pin into shell.
3. Use the extraction tool (white) to remove a crimped wire to correct an error.
4. Access to the serial connection should be available within view of the monitored lanes.
   - For example: inside an access panel or cabinet on the pole.
   - Verifying the sensor's calibration is easy when the user sees the RTMS data together with manual counts.

MS Connector Pin-Out

Caution

Pin labeling above is a guideline only – verify pin location on actual connector before inserting wire.

Warning

The RTMS unit can be configured for a variety of communication options. It is important to know which options are included with your unit prior to preparing cables. MS connector pins cannot be shared. Take note of the individual wiring instructions provided in this manual.

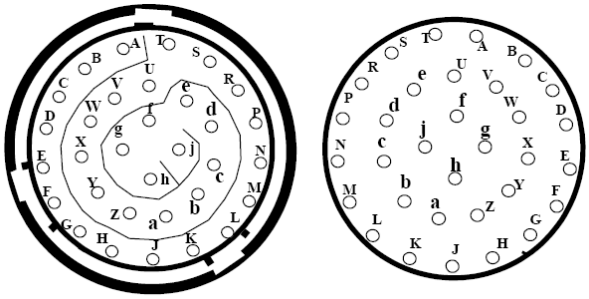

Figure 2.4. MS Connector

Table 2.2. Cable Pair Requirements

Pin Number	Function	Dual Loop Pin Assignment	Dual Loop / Contact Closure
A, B	Isolated Zone 1 or Zones 1, 2	A, J	Zone 1 Primary, Zone 9 Secondary
C, D	Isolated Zone 2 or Zones 3, 4	B, K	Zone 2 Primary, Zone 10 Secondary
E, F	Isolated Zone 3 or Zones 5, 6	C, L	Zone 3 Primary, Zone 11 Secondary
G, H	Isolated Zone 4 or Zones 7, 8	D, M	Zone 4 Primary, Zone 12 Secondary
J, K	Isolated Zone 5 or Zones 9, 10	E, N	Zone 5 Primary, Zone 13 Secondary
L, M	Isolated Zone 6 or Zones 11, 12	F, P	Zone 6 Primary, Zone 14 Secondary
N, P	Isolated Zone 7 or Zones 13, 14	G, R	Zone 7 Primary, Zone 15 Secondary
R, S	Isolated Zone 8 or Zones 15, 16	H, S	Zone 8 Primary, Zone 16 Secondary
W	Rx+ Ethernet or RxD 2nd port	Not Applicable	Not Applicable
T	RxD- (negative) Serial Port RTMS input RS-232 Rx or RS-485 RxD- (negative)	Not Applicable	Not Applicable
V	TxD- (negative) Serial Port RTMS output RS-232 Tx or RS-485 TxD- (negative)	Not Applicable	Not Applicable
U	Serial Ports and Contacts Signal Group	Not Applicable	Not Applicable
X	CTS or RS-485 TxD +	Not Applicable	Not Applicable
Y	CTS or RS-485 TxD +	Not Applicable	Not Applicable
Z	Rx- Ethernet or RTS 2nd Serial port	Not Applicable	Not Applicable
a	This field intentionally left blank.	Not Applicable	Not Applicable
b	This field intentionally left blank.	Not Applicable	Not Applicable
c	This field intentionally left blank.	Not Applicable	Not Applicable
d	Tx Ethernet TxD 2nd Serial port	Not Applicable	Not Applicable
e	Tx Ethernet or CTS 2nd Serial port	Not Applicable	Not Applicable
f,g	Low Voltage power 12-24V AC or DC	Not Applicable	Not Applicable
H,j	115V AC power	Not Applicable	Not Applicable

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Standard RS-232 Port Wiring

The standard RTMS RS-232 port wiring consists of Transmit (Tx), Receive (Rx), RTS, CTS and Ground lines wired to the MS pins respectively. The use of a female connector and wiring shown allows the use of standard serial cable for direct connection to the PC for setup purposes.

Rear views of connectors are shown to assist in cable preparation. The RTMS is configured as a DCE device.

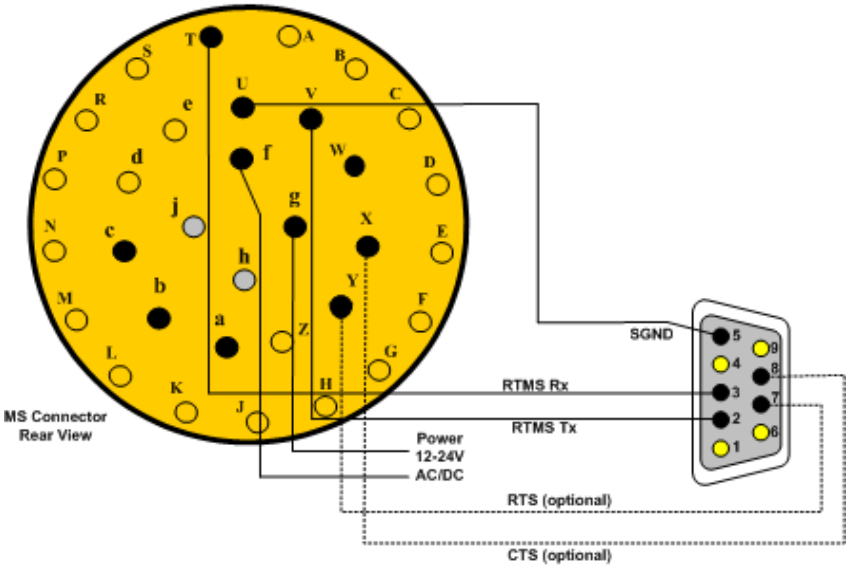

Figure 2.5. RS-232 Wiring Diagram

The RS-485 Port

Over short distances (30 ft) the wiring diagram shown below is compatible with an RS-232 port. There is no standard pin configuration for RS-485 on a DB9 connector. The wiring diagram shown will connect directly to a RS-232 configured DB9 without the need for an RS-232/RS-485 converter.

A disconnect point is recommended to allow the RTMS to be detached from the transmission line without disruption of communications with other sensors on the line. See Connecting RTMS to External Modems for details.

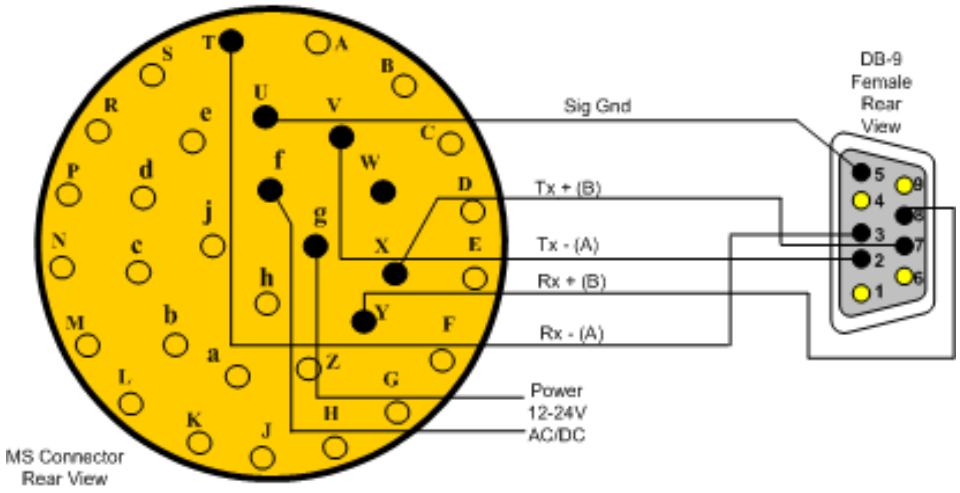

Figure 2.6. RS-485 Wiring Diagram

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The TCP/IP Port with RS-232

CAT5 cable must be used for lengths between 30 ft [10m] and 330 ft [100m]. Lengths greater than 330 feet are not supported for Ethernet communication.

It is recommended that both TCP/IP and RS-232 ports be brought out to their respective connectors, as shown. The RS-232/485 port is useful for setup and maintenance purposes, the IP port for data collection and remote setup.

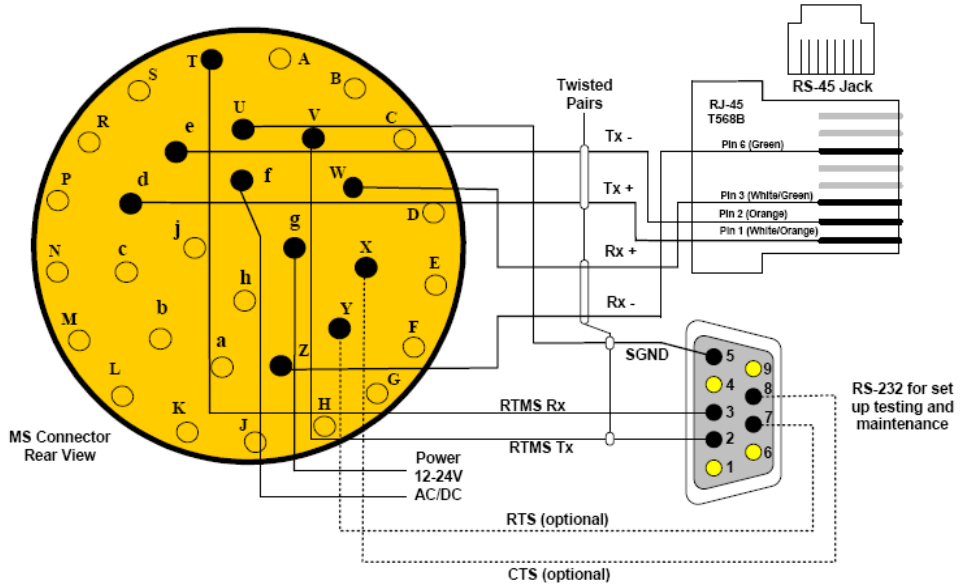

Figure 2.7. TCP/IP Port with RS-232 Wiring Diagram

The TCP/IP Port with RS-485

It is recommended that both TCP/IP and RS-232 ports be brought out to their respective connectors, as shown. The RS-232/485 port is useful for setup and maintenance purposes, the IP port for data collection and remote setup.

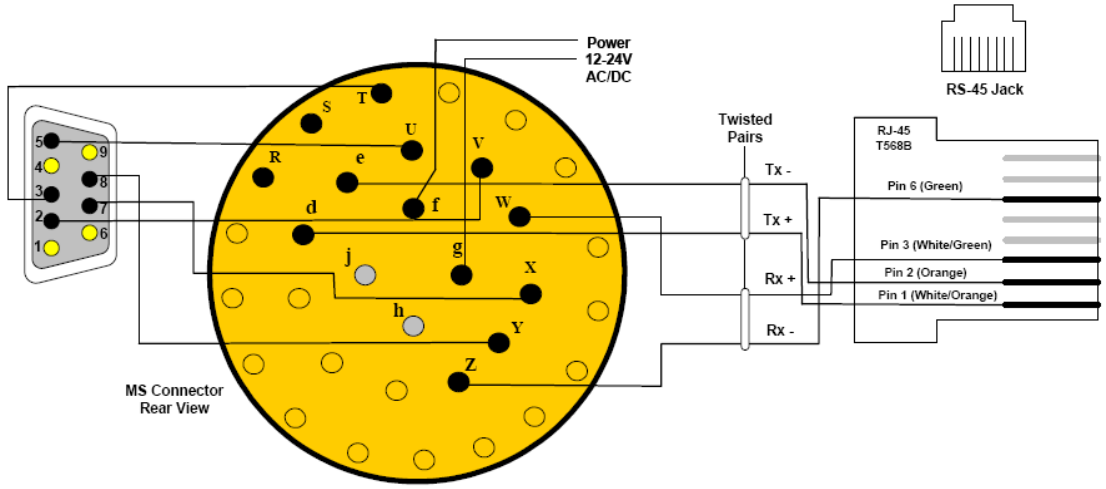

Figure 2.8. TCP/IP Port with RS-485 Wiring Diagram

Dual RS-232 Ports

The G4 has two independent RS-232 serial ports. The primary port can be soft-configured to RS-485 operation for increased range. The secondary port can be soft-configured to RS-422. The second port is also used when another device such as an RF Modem or TCP/IP server is ordered with the unit. Below is the wiring for two independent RS-232 ports configuration. Each port can be separately operated at its own speed and carry different streams of information.

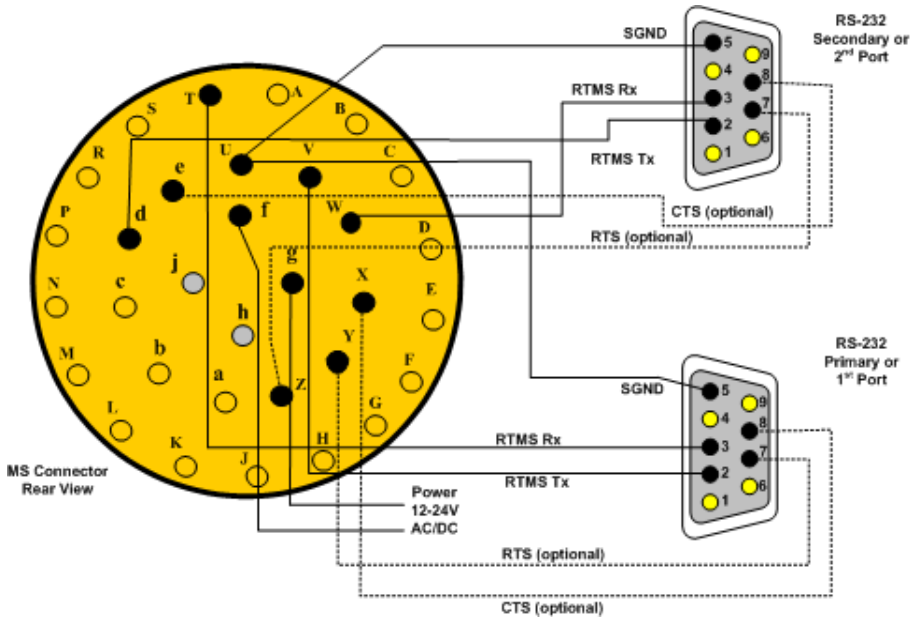

Figure 2.9. Dual RS-232 Wiring Diagram

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Contact Closure

The G4 can provide, in parallel with the serial port and RF/IP/Cellular communications, up to 16 contact closures to deliver real time presence indication in each of its detection zones. The contacts are arranged in two wiring configurations and operating modes:

- 8 Isolated contact pairs (as in RTMS Models X2/X3 and K3). In this configuration each of the contacts is isolated from the other.
- 16 contact pairs. In this configuration all contacts will share a common Serial Ground. The contact closures can be configured to operate either as Single Loop mode or Dual Loop (Speed Trap) mode. Single mode provides up to 12 lanes or zones of detection, Dual mode provides up to 8 lanes of Dual Loops

You should wire the cable based on your preferred contact closure output mode and set the RTMS mode using the Contact Closure Setup in the Advanced screen of WinRTMS.

RS-485 Multi-Drop

The RS-485 setting of the G4 Serial Port allows up to 32 RTMS units to be employed on the same serial bus for distances up to 4000 feet (1200m).

The diagram below shows the use of a 4-Wire line. The use of a half-duplex 2-Wire line is feasible but it is suitable for data collection only. Consult RS-485/422 Application Guides for details on wiring solutions for your project.

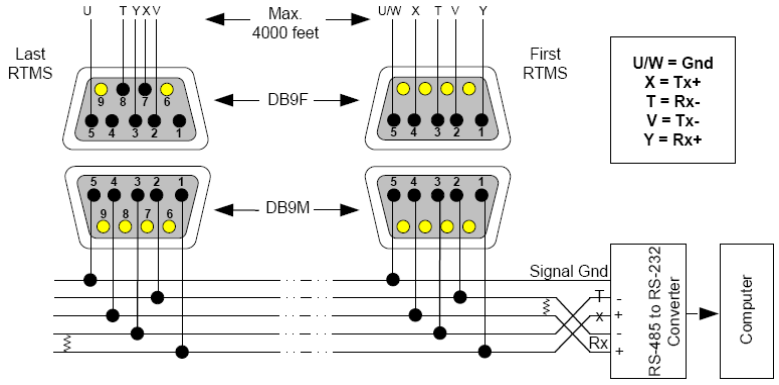

Figure 2.10. RS-485 Multi-Drop Wiring

Wiring Notes

1. The DB9 connectors and terminal blocks serve as a disconnect point, which allows disconnecting the RTMS from the transmission line for direct connection to the laptop's COM port for setup.
2. Terminating resistors (100-120 ohms) are required at the extreme ends of the Receive and Transmit transmission pairs.
3. Transmit and receive pairs must be transposed when connecting to a DTE (PC, Data processing System). To interface with a PC an RS-485/232 converter may be required as PCs typically do not have RS-485 interfaces.
4. RS-485/232 converter connector type and pin assignment are not shown as these are not standardized and vary between models.

RTMS Troubleshooting Guide

Field troubleshooting of the RTMS consists mainly of ensuring that the unit is powered and communicating. Communication with the sensor in Normal mode is confirmed by presence of the moving Vehicles and menu buttons, and by the flashing of the indicator in the lower right corner of the screen, denoting data transmission activity. The table below outlines symptoms and suggested action in troubleshooting power and communication problems:

Symptoms	Possible Causes	Suggested Action
Timeout has expired and the main Communication Screen is displayed.	RTMS is not powered.	Check that the supply voltage is within limits at source and at the MS connector. Voltage outside the limits (too low or too high) will cause power supply to shut down.
	Cable problem.	Check cable pin-out and continuity.
	Hardware fault.	With power applied to the RTMS and DB9F disconnected from PC, check the RTMS serial Port by measuring approx. 10V between pins 2 and 5 of the DB9F RS-232 connector. If the voltage is not present there could be a hardware fault in the RTMS serial port or power supply.
	PC unable to communicate with the RTMS due to H/W problems.	Check that PC's serial port is operational (10V present between pins 3 and 5).
Polling range window is displayed on start of WinRTMS.	WinRTMS is in Multi-drop mode.	Click **OK** on the polling range window. RTMS Setup default screen will be displayed. Select **TOOLS** » **Change to Direct mode** if direct access to one RTMS is desired.
PC and sensor are communicating (Sensor settings are displayed on buttons) but target “blips “are not shown on the main screen.	RTMS is not in Normal mode. Unit is improperly aimed. Internal parameters corrupted. MW module fault.	Ensure the unit is in the Normal mode. Check sensitivity setting. See if targets appear when sensitivity is increased. Cycle power to unit and then edit parameters (mode, sensitivity, zone setup, etc). Run Self-Test if above not successful. Report findings to ISS Canada.
Main screen shows target blips but no zone icons or parameters on buttons.	RTMS transmits and WinRTMS displays received data but RTMS has not received the WinRTMS READ command.	Check cable to ensure continuity between MS connector pin T and COM port's pin 3.
Self-Test results are not displayed on PC screen.		

RTMS Technical Specifications

Microwave Signal and Coverage Area

	Model K4
Center Frequency	24.125 GHz
Bandwidth	50 MHz
Power Output	10mW
Beam Width—Vertical (Elevation)	50°
Beam Width—Horizontal (Azimuth)	12°
Side Lobes	>-20dB
Range	2-75 Meters (6-250 feet)
Number Of Detection Zones And Lanes	12

Accuracy of Measurement & Error Rates

Measurement	% Error *
Per Lane Volume—Side-Fired	5%
Volume Range	0-65535
Per Lane Occupancy—Side-Fired	5%
Occupancy Range & Resolution	0-100%, 0.1%
Per Lane Classification By Length (6 classes)	10%
Class Lengths Limits range and resolution	100ft., 1ft.
Average Per Vehicle Speed—Side-Fired	10%
Speed range and resolution	0-180km/h (110 MPH), 1 MPH
Resolution of time events	1.25mS
Voltage readout resolution	0.1v

*Accuracy Performance Conditions

Error performance parameters outlined above are achieved under normal, high-flow traffic conditions and are subject to proper installation and setup. Lower accuracy is expected under the following conditions:

- Low speed, high congestion conditions: The RTMS tends to over-count under very low speed conditions (below 1 mph).
- Improper selection of installation site: insufficient set-back, height beyond the recommendation, obstruction by barriers or high fences before monitored lanes.
- Improper fine tune setting for the road geometry (lane width, barriers, etc.) will result in “splashing” and, therefore, over-counting.
- In Forward-Looking Hwy configuration the following conditions may result in errors:
  - High variance between the volumes in the speed trap zone.
  - Improper aiming, mounting height (too high) or incorrect offset parameters
  - Obstructions within the trap range.

Mechanical

Measurement	Dimensions
Enclosure Dimensions	21×21×16cm (8×8×6 inches.)
Weight (Without Optional Equipment)	1.5kg (3.5 pounds.)
Enclosure Material	polycarbonate
Weatherproofing	NEMA-4X and IP-65
Mounting	Zinc plated steel universal ball-joint bracket capable of support a load of up to 20lbs. (Vertical or horizontal). Lynch-pin locking allows quick sensor replacement without disturbing the aiming.
Allowable pole flexing	Less than 5 degrees

Power Requirements & Consumption

Component	Details
RTMS standard power requirement	12-24V AC or DC
Polarity protection	not polarity sensitive
Over-voltage shutdown limit	34VDC or 24VAC
Recommended fusing (external)	2A slow blow minimum
Power consumption (Without optional equipment)	3 Watts
Automatic recovery from power failure	Within 20 seconds
Commercial AC power option	115±20V AC @ 50-60Hz

Interfaces

- Isolated Serial ports programmable to RS-232/485 including hardware handshake. Speed is adjustable between 2400 and 115200 bits-per-second. RS-485 range: up to 1200m (4000 feet).
- Optional Bluetooth wireless connection
- Optional Second Serial port programmable to RS-232/422 including hardware handshake
- Optional integral 10/100 Base-T Ethernet supporting TCP, UDP, IP, ARP, ICMP
- Optional integral DSS, CDMA, GPRS or Wi-Fi RF modems with integral or external antenna
- Optional integral NTCIP 1209 protocol
- Optional IP Camera with multiple modes of operation (See separate specification.)
- Optional Contact pairs: 8 isolated contacts or 16 common ground contacts rated at Maximum current 100mA; Maximum voltage 350V; Maximum dissipated power 300mW
- Internal Data memory capacity : 8 Mb (6 months at 5-minute statistics)

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Upgrade Capability

User upgrades of both hardware and firmware available. RTMS supports remote firmware upgrade.

Surge Immunity

The RTMS withstands ±1kV surge (rise time = 1.2 µsec, hold = 50µsec) applied in differential mode to all lines, power and output, as defined by IEC 1000-4-5 and EN 61000-4-5 standards.

Environmental Conditions

	Operating Limits	Shipping & Storage
Temperature Range	-37 to +74°C [-35 to 165°F]	-40° to 80°C [-40° to 171°F]
Humidity	Up to 95% Relative Humidity	Up to 95% Relative Humidity
Vibration	2g up to 200Hz	
Shock		5g 10mS sine wave
Wind	Winds up to 160 km/h [100mph]will not degrade performance	
Precipitation	Up to 100mm/h	

Printed circuit boards are conformally coated for protection against humidity and corrosion.

Except as may be other stated herein for a particular item, no item, component, or subassembly shall emit a noise level exceeding the peak level of 55Ba when measured at a distance of one meter away from its surface.

Electromagnetic Interference

Certified under US FCC Rule part 15 Class A, Canadian CSA C108.8 M1983 Class A, CE.

Reliability

The RTMS is designed for *Mean Time Between Failures* (MTBF) of in its operating environment of 90000 hours [10 years].

Recommended Surge Protection

It is recommended that communication and power lines of the RTMS be equipped with surge protecting devices, located as close as possible to the sensor. For example: locate surge protection in a cabling cabinet mounted on the same pole as the RTMS. The surge suppression should be applied as follows:

- The Tx and Rx communication lines should employ low capacitance, bipolar surge suppressors with a clamping voltage of 15 V.
- The Signal ground line should be grounded.
- A bipolar surge suppressor with a clamping voltage of 40 V shall be placed between two low voltage (16-18V AC or 12-24VDC) power lines.
- One of the power lines, negative line in case of DC, shall be grounded.

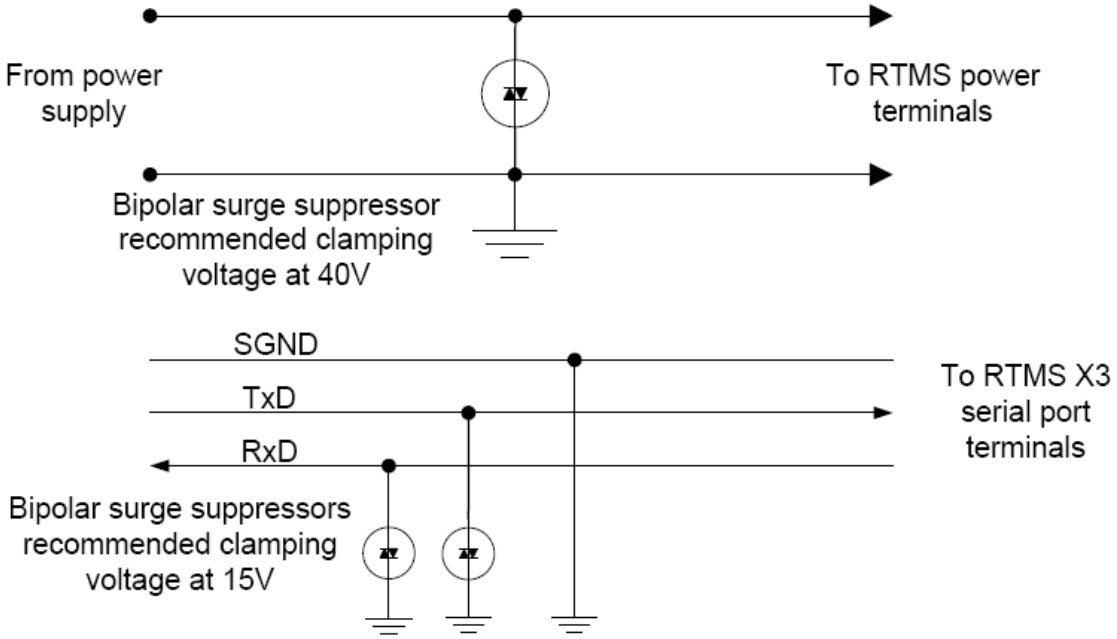
From power supply
To RTMS power terminals
Bipolar surge suppressor recommended clamping voltage at 40V
SGND
TxD
RxD
To RTMS X3 serial port terminals
Bipolar surge suppressors recommended clamping voltage at 15V

Figure 2.11. RTMS Surge Suppression

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Chapter 3
G4 Software

Reference

RTMS System Requirements

Once installed, RTMS sensors must be calibrated using the RTMS Setup Utility software. System requirements are as follows:

Component	Requirements
Operating System	Windows XP, Windows Vista
Software	Microsoft .NET Framework 3.5
Hardware	USB, serial, or Ethernet port to communicate with RTMS hardware

About The RTMS Setup Utility

WinRTMS is supplied as a self-installing program named WINRTMSINST.EXE.

- The installer creates a folder in C:\PROGRAM FILES\EIS\WINRTMSV#. (# is the version number.)
- This folder contains the WINRTMS.EXE executable program and auxiliary files.
- The installer places a shortcut on the desktop.

Communication

The WinRTMS program can communicate:

- With a single RTMS (*Multidrop*)
- With multiple RTMS sensors (when these sensors are on the same communications channel and *Polled Data Mode* is active.

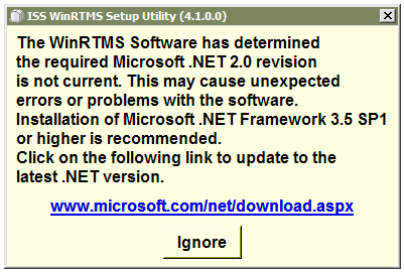
Procedures

The procedures listed below show you how to perform all common setup and software procedures.

Microsoft .NET Runtime Warnings

WinRTMS runs with Microsoft .NET 2.0 and higher. Run the software with Microsoft .NET 3.5.1 for optimal performance. In most cases the software performs acceptable but you may notice visual differences in the graphical user interface. The software provides a warning if the .NET version is incompatible.

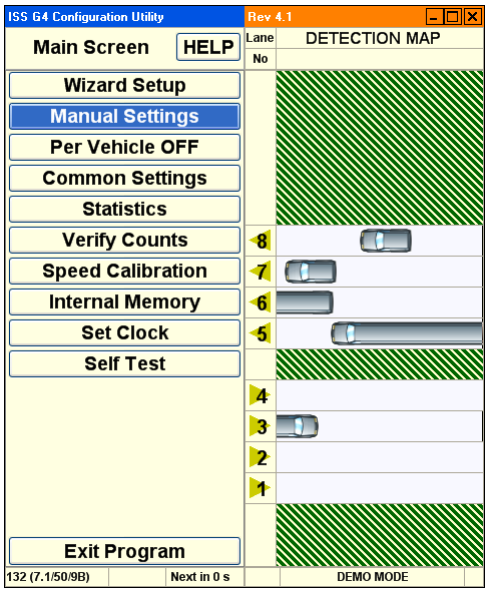
Figure 3.2. The .NET Version Warning. Click Ignore to proceed.


ISS WinRTMS Setup Utility (4.1.0.0)
The WinRTMS Software has determined the required Microsoft .NET 2.0 revision is not current. This may cause unexpected errors or problems with the software. Installation of Microsoft .NET Framework 3.5 SP1 or higher is recommended.
Click on the following link to update to the latest .NET version.
www.microsoft.com/net/download.aspx
Ignore

How to Navigate the RTMS Interface

The WinRTMS buttons and menus may be operated by any method listed below. The terms *select* and *click* are used throughout this manual to describe actions you can complete using the mouse or keyboard:

Figure 3.1. The RTMS User Interface.



- The interface consists of buttons and text displays.
- Point and click to select a button.
- Navigate using **up**/**down**/**left**/**right** keys and **ENTER** keys. Select by the arrow keys and take action by hitting **ENTER**.
- In some cases the **TAB** key is use to navigate between the two main panels.

Get Started

Caution

Windows may disable the COM port if port activity is detected during the boot process. DO NOT connect the RTMS to the COM port before Windows startup is complete.

When the hardware installation is complete, getting started with the RTMS software is a three-part process:

1. Establish Physical Connection: power up computer and connect computer to RTMS hardware via appropriate cable.
2. Establish Data Connection: establish an active data connection with the RTMS hardware.
3. Establish Traffic Detection: configure traffic detection parameters and begin detection.

While configuring your system, use the three-part list shown above to create your own task list and gauge your progress.

Establish a Connection with the RTMS Hardware

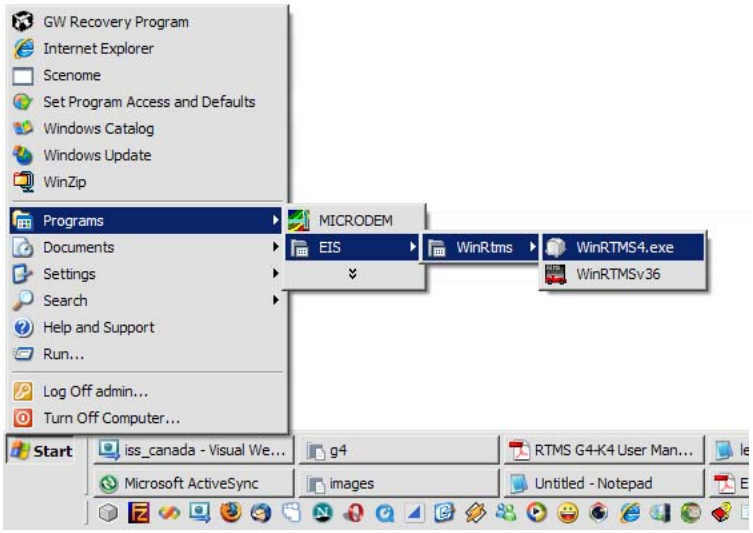
Once the hardware is installed, you must establish a data connection between the RTMS hardware and a computer running the RTMS software. To establish a connection between the RTMS hardware and software:

1. Connect the RTMS hardware to an already-running personal computer.
2. With the RTMS sensor powered and connected to the PC, click the WINRTMS.EXE icon to launch the RTMS Setup Utility program.
   - While trying to establish communications, WinRTMS looks for a single sensor that matches the current settings (address, communication rate).
   - If successful in establishing communications, WinRTMS displays setup options on the Main Screen.
   - If unsuccessful, WinRTMS performs a scan for various baud rates to find the correct one. This might take a few minutes.
3. If unable to establish communications, WinRTMS opens the Communications Screen to allow you to direct a search for the RTMS.
   - See the Troubleshooting Guide for additional suggestions.
   - Microsoft .NET Framework 3.5 is not installed.
   - RTMS is not powered.
   - RTMS is not connected to the PC.
   - RTMS connection cable is faulty.
   - Wrong COM port is selected.
   - Communication of RTMS is IP.
   - Tx & Rx lines are crossed.
   - COM port is being used by another program.

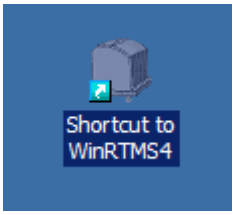
How to Run WinRTMS in Demo Mode

If you are a new user, use the following instructions to start and configure the RTMS setup wizard:

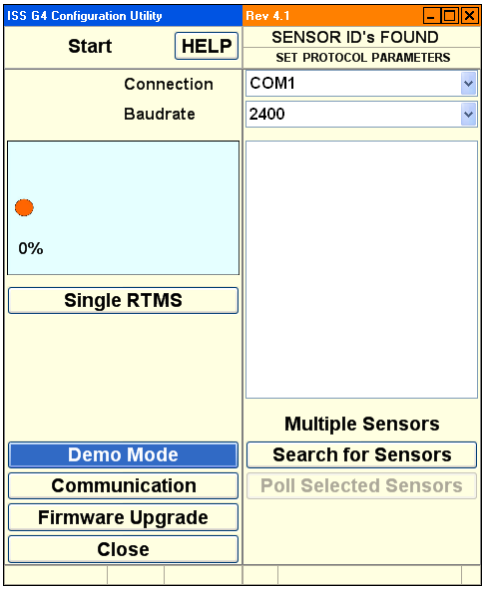
1. Select **Start** » **Programs** » **ISS Canada** » **WinRTMS** » **WinRTMS4.exe**.



2. Alternatively, you may start the software from the desktop if you chose to install a desktop shortcut during the installation process.
3. Double click the shortcut icon.



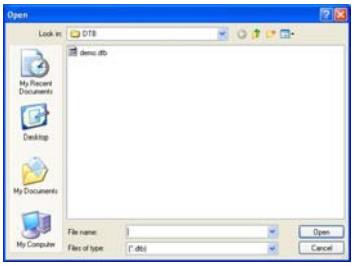
The software starts and displays the start screen.



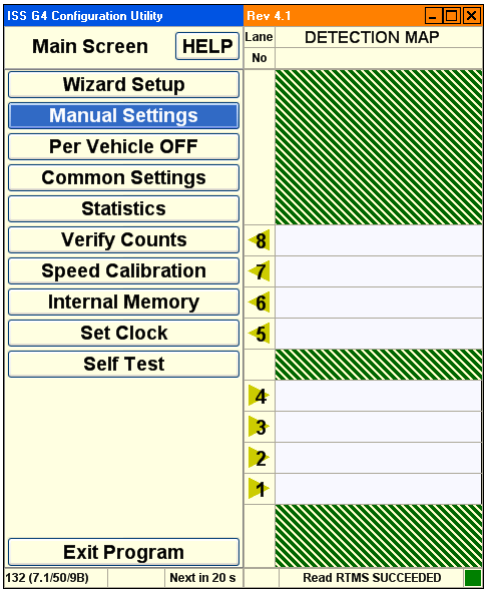
4. Left click the button named **Demo Mode**. This button is found at the bottom left of the user interface.

   This displays the Open file dialog.

5. Double click the sample database named **DEMO.DTB** or any other saved G4 setup file.



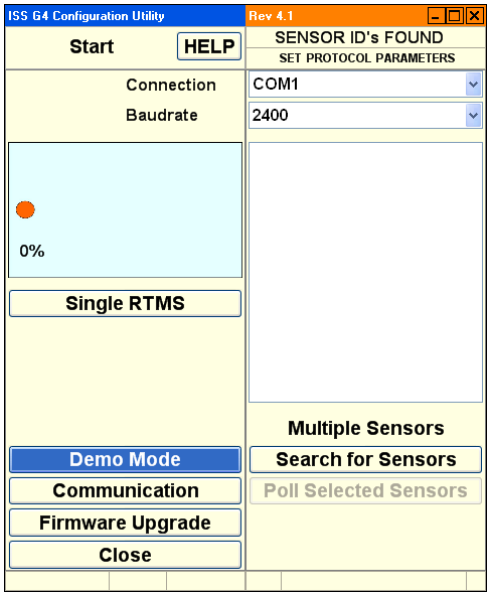
6. This initializes the program with sample data.



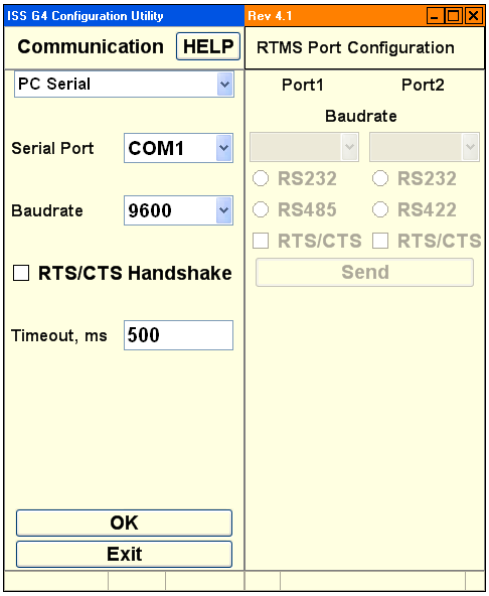
How to Modify or Troubleshoot the Connection with the RTMS Hardware

The Communications Screen allows you to troubleshoot data connections if you encounter a problem making a data connection on startup. You can also use these options to reconfigure communication parameters as needed throughout the product life-cycle.

The basic communication options screen:



1. Use the basic communication screen to accomplish the following:
   - Change the WinRTMS Utility communication parameters such as the mode from Single RTMS (Direct) to Multiple Sensors (Multidrop).
   - Search for Sensors by first using the default port (and parameters) before making any changes. During the search for Multiple Sensors, several sensors may be found. In this case their Sensor ID numbers will be displayed, allowing polling of all of them or a Selected Range of IDs as well as focusing on a single sensor ID.
2. Click the **Communication** button to display advanced communication parameters in both panels:



3. Use the advanced communication options on the left side of this screen to accomplish the following:
   - Set the WinRTMS PC COM port and baud rate for communicating with the RTMS when **Serial** is selected.
   - The TCP/IP selection allows you to set an IP address WinRTMS uses to communicate via the Internet.

Warning

Activating RTS/CTS without wiring in place to the RTMS leads to loss of communication.

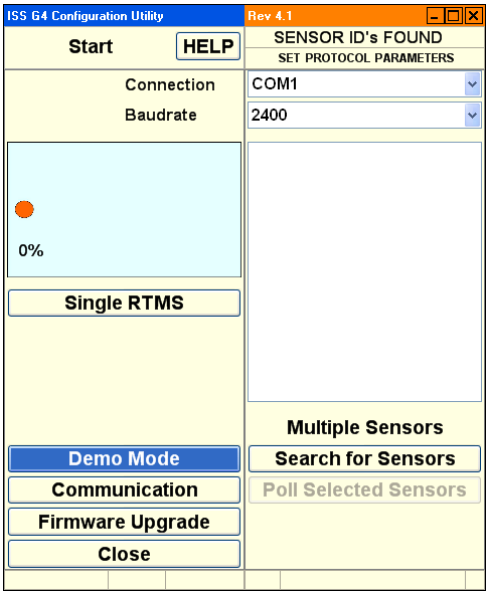
4. Use the advanced communication options on the right side of this screen to accomplish the following:
   - Set RTMS Sensor communication parameters of both ports to the correct speed from the drop menu.
   - Activate RTS/CTS handshake when necessary.
   - Alter communication speed (baud rate).
     - 9600 bits per second (bps) is the factory default for serial units.
     - Data rates below 9600 are useful where high quality transmission lines are not available. They are however, unsuitable for setup and must be selected after setup has been completed. When using data rates below 9600 bps, the RTMS data mode must be set to STAT to reduce the amount of data and prevent communication problems. See DATA MODE for further details.
5. Click **Send** to change the RTMS and WinRTMS will change automatically.
6. Click **OK** to finish.

How to Set Up Serial Communication

Serial communication is the simplest form of communication between an RTMS sensor and WinRTMS. To configure serial communication:

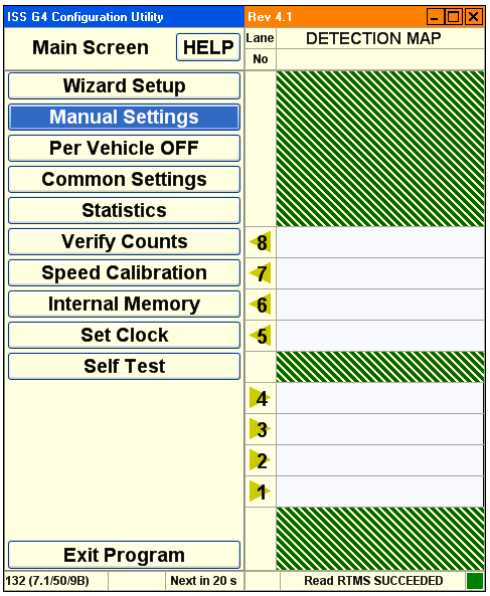
1. Power up the computer.
2. Connect the RTMS sensor to the computer with a serial cable.
3. Start WinRTMS.
4. The WinRTMS software starts and begins to search for sensors. The software splash screen is displayed. This process may take a few minutes.

   The software displays the search screen if a sensor is not found:



   This screen allows you to direct a search for sensors.

   The software displays basic configuration if a sensor is found:



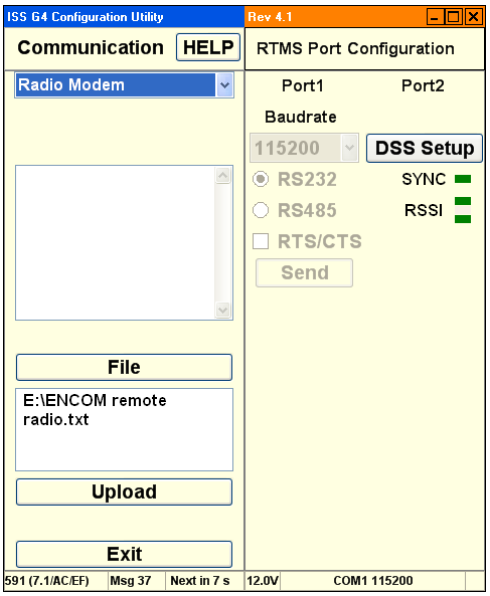
   This screen allows you to configure WinRTMS.

How to Set Up DSS

To configure WinRTMS to communicate with a sensor via digital radio modem:

1. Start WinRTMS and connect to the RTMS sensor.
2. Select **Manual Settings** from the listed options.
3. Select **Communication** from the listed options.

   The RTMS Port 1 Baudrate must be set to 115200 prior to accessing the internal DSS radio modem
4. Select **Radio Modem** from the drop down menu. (**PC Serial** is selected by default.)



5. Left click the button named **File** and select a text file containing a properly formatted modem instruction set:

Note

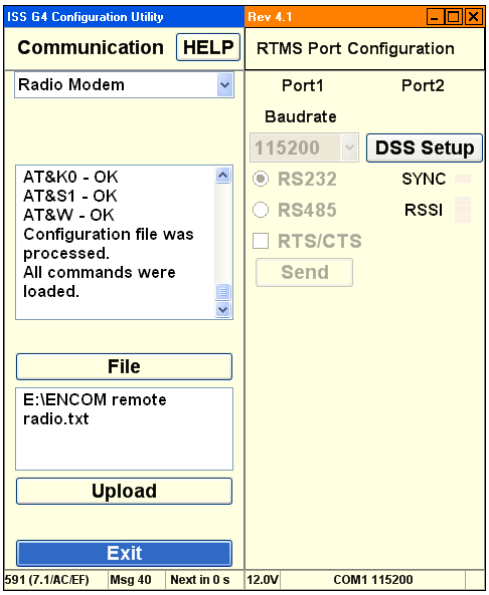
Modify only the integers subsequent to the equals (=) sign for the following parameters:

- ATS104=1. Network address. Range is 1-255.
- ATS105=1. Unit address. Range is 1-65534.
- ATS106=1. Primary hopping pattern. Range is 1-63.
- ATS107=1. Encryption key. Range is 1-255.
- ATS108=3. Power setting. Range is 0-3.
  - 0 = 1 mW
  - 1 = 10 mW
  - 2 = 100 mW
  - 3 = 1000 mW

A standard file of the AT commands are included with the software – changes must be made to the 5 items listed below to customize. Changes to other AT commands can potentially cause loss of communication

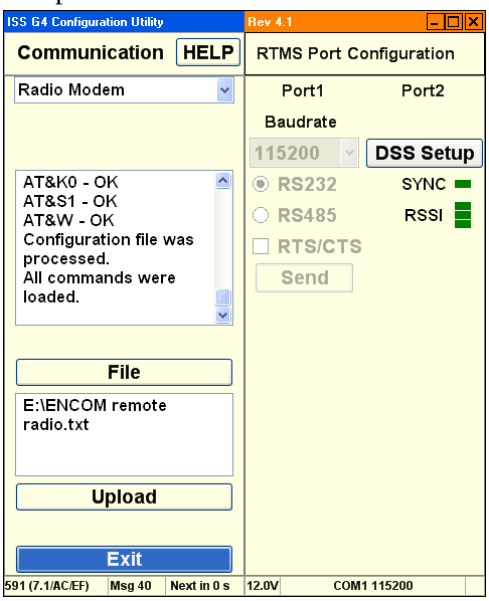
```
;*** Comments start with ';' ***
; Important. The first command must be ATQ0 (send result
code).
ATQ0
; Important. The second command should be ATV1 (verbose
response)
ATV1    ; verbose response
ATS0=1
ATS2=43
ATS101=3
ATS102=1
ATS103=2
ATS104=1
ATS105=1
ATS106=1
ATS107=1
ATS108=3
ATS109=3
ATS110=1
ATS111=1
ATS112=79
ATS113=2
ATS114=0
ATS116=2
ATS117=0
ATS118=0
ATS119=1
ATS120=0
ATS121=0
ATS123=-120
ATS124=-120
ATS125=0
ATS127=0
ATS129=25
ATS130=0
ATS131=0
ATS205=0
ATS206=19
ATS213=2
AT&C2
AT&D0
AT&E0
AT&K0
AT&S1
AT&W
```

6. Left click the button named **Upload**.
7. The software displays status messages during the procedure and indicates success or failure. The most common cause of failure is an improperly formatted initialization file.



8. Click **Exit**.
9. Click **Communication**.

10. Select **Radio Modem** from the drop down menu. (**PC Serial** is selected by default.)
11. Proper communication is indicated by the green synchronization indicator below the DSS Setup button.



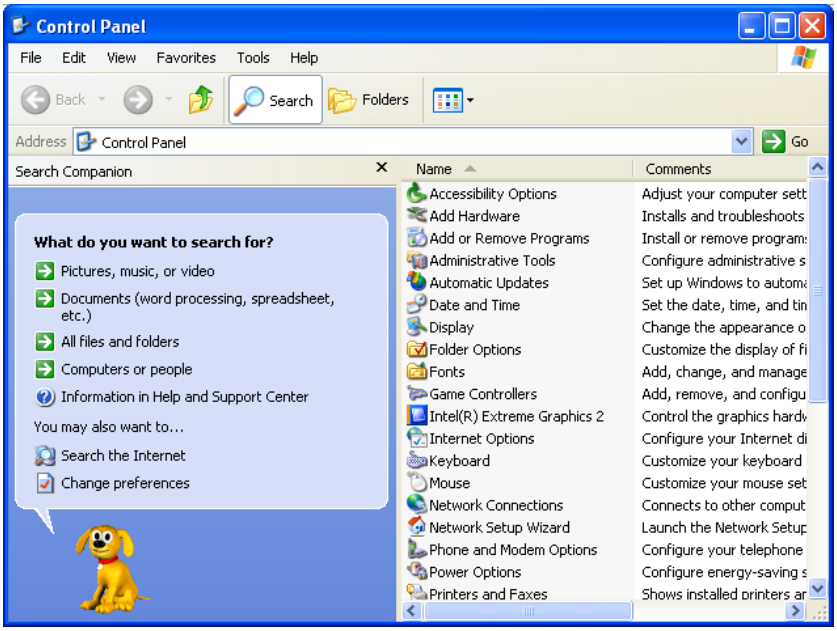
- The master DSS communicating with the RTMS slave or repeater must be of the same type and frequency band. All units supplied on the same order will be of the same type and frequency. Refer to the manufacturer's documentation and instructions for setup of the master DSS parameters.
- Output Power Level is determined based upon the Radio Site Survey. Strength of signal is important to ensure data quality. If power setting is too high it may interfere with other radio systems in the area, if it is too low the data messages may be missed.
- It is mandatory to make Unit Address = RTMS Sensor ID.

12. Click **Exit**.

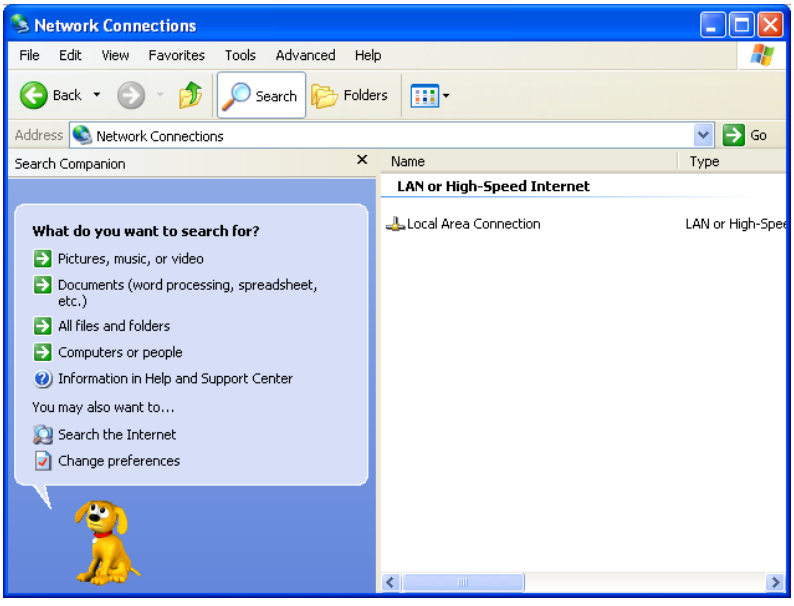
How to Set UP TCP/IP Communications

To set up the RTMS TCP/IP Interface

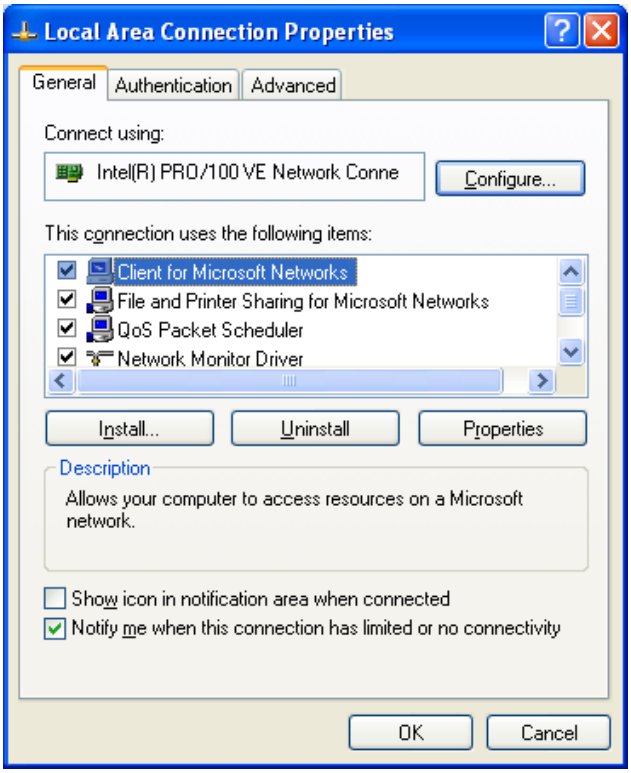
1. Connect RTMS to the PC. The PC's Network Port Link and Activity Indicator lights indicate power and connection.
2. Use a crossover (Null) cable if communication is not established.
3. Open the Windows® Control Panel.



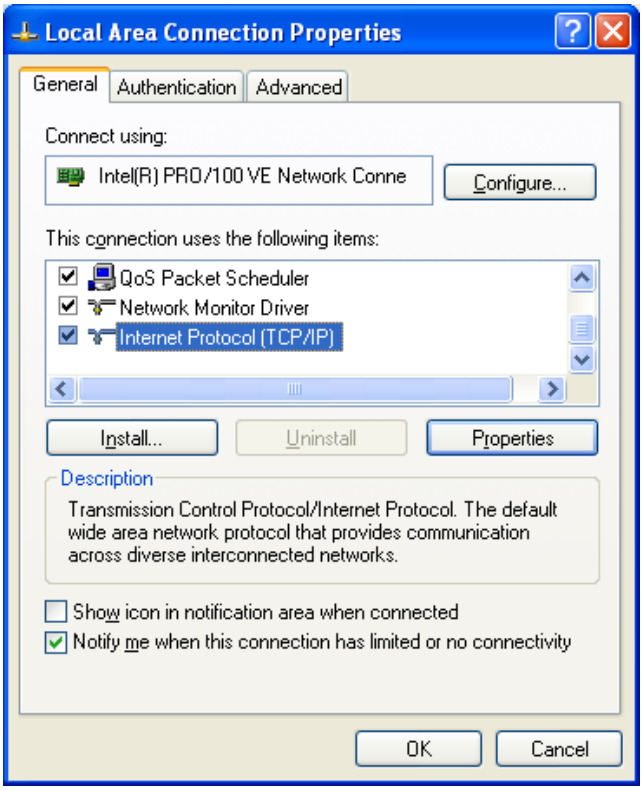
4. Double click the **Network Connections** icon.



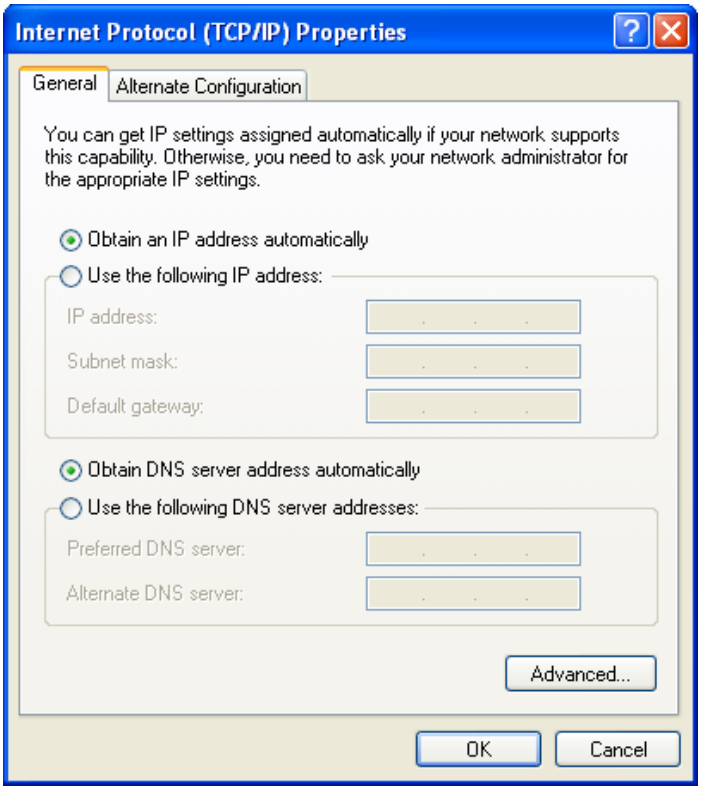
5. Right click over **Location Area Connection** and select **Properties** from the listed options.



6. Select **Internet Protocol (TCP/IP)** from the listed protocols.

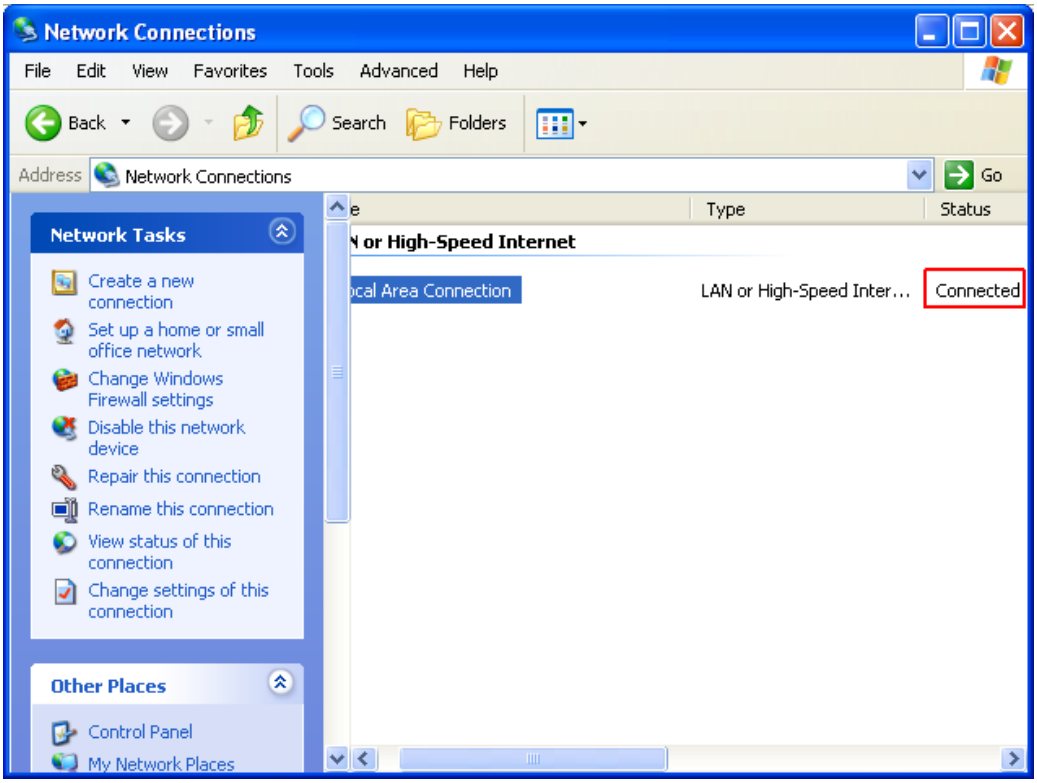


7. Left click the button named **Properties**.


Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

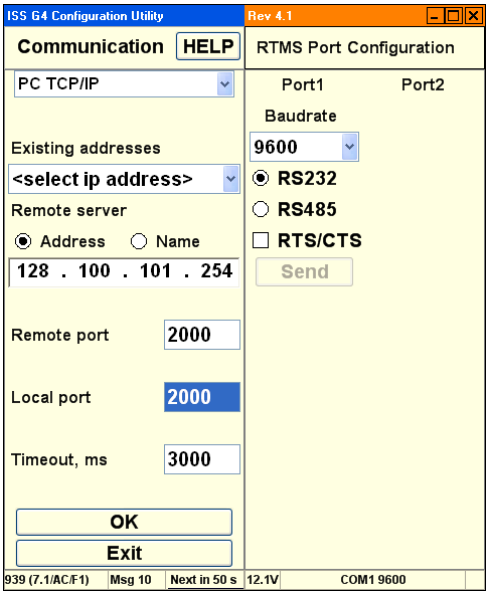
8. Select **Use the following IP address**.
9. Set IP address to **128.100.101.1**.
10. Set Subnet mask to **255.255.0.0**.
11. Click **OK**. This returns to the Network Connections screen.
12. Click **Close**. This closes Network Connections.

13. Examine the Network Connections screen. **Status** should indicate **Connected**. This verifies that the RTMS and the computer are connected.



14. Start WinRTMS.
15. Select **Communication**.
16. Select **TCP/IP** from the drop down below the **Help** button.
17. Enter the IP address in the **Remote Server** field. This default address is **128.100.101.254** (set at the factory).
18. Set **Remote Port** to **2000**.

19. Set **Local Port** to **2000**.

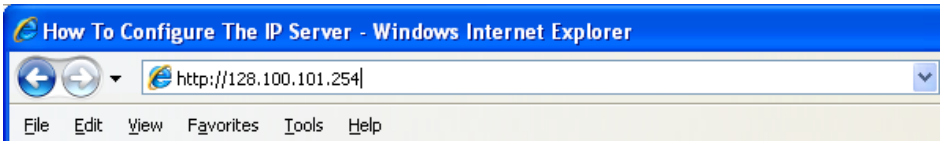


20. Click **OK**.
21. Click **Single RTMS**.
22. WinRTMS connects to the RTMS sensor and displays the main screen.
23. Proceed with sensor configuration (run the wizard).

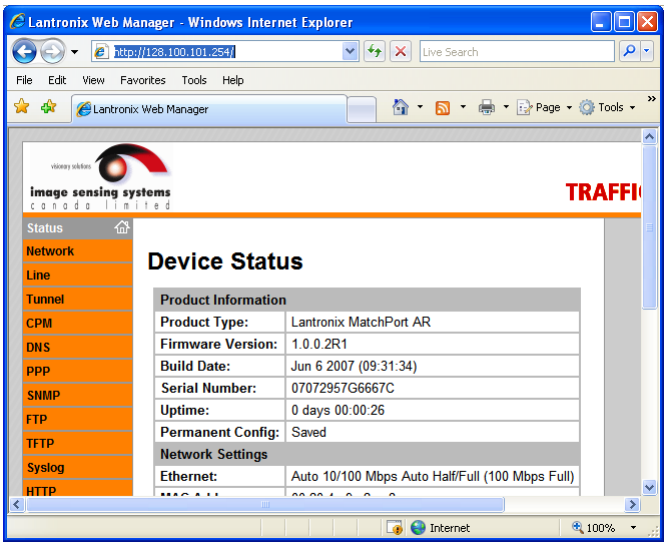
How to Configure the IP Server

To configure the IP server (which includes changing the RTMS sensor IP address):

1. Start Internet Explorer®.
2. Type **http://128.100.101.254** in the address bar and hit **ENTER**.



3. Type **admin** for User name and **PASS** for password.
4. The Lantronix® interface appears:



5. Please consult Lantronix documentation for information on configuring the IP server. Serial baud rate communication internally to RTMS is fixed at 115200 – do not adjust.

How to Use the Automatic Setup Wizard

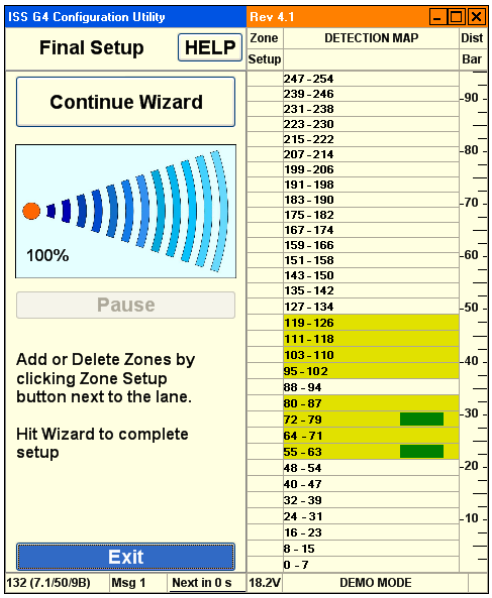
The automated zone setup process requires free flowing traffic in all lanes of interest. It scans the range of the RTMS microwave beam and positions up to 12 detection zones—representing lanes where vehicles are detected.

The WinRTMS software automatically detects traffic in its detection area and configures lane parameters accordingly. This is a two-stage process:

- WinRTMS finds the lanes.
- WinRTMS fine tunes the lane assignment/detection parameters.
- **You may receive warnings while detecting traffic in low-volume lanes**. The warning asks if you would like to continue detection for 1 additional minute. In some cases, such as when the detector overlaps an exit ramp, continuing detection provides little benefit.

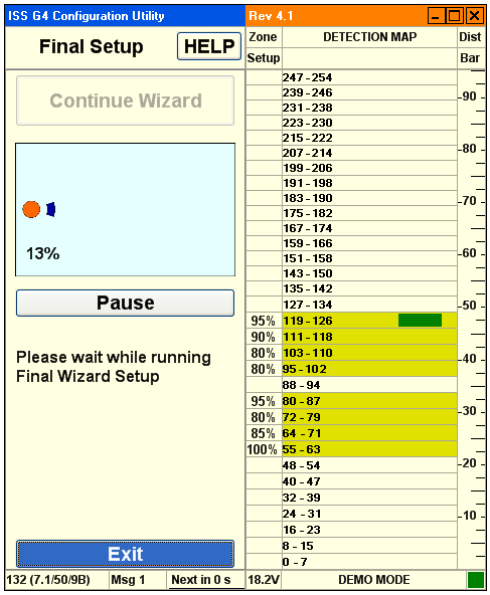
To perform Automatic Setup:

1. Click the button named **Wizard Setup**
2. The resulting zone setup is presented for approval on the detection map when the Progress Bar reaches its 100% point. The wizard sets sensitivity and position detection zones where vehicles are detected.



   – Using the blips, confirm visually that the proposed location of lanes corresponds to the lanes you wish to include in the setup.
3. Click the **Zone Setup** buttons to add or delete zones until desired number and position are left.
4. Zones can be added or deleted in Fine Tune later as well.
5. Click the **Continue Wizard** button again to complete the setup.

Final Setup:



The Wizard continues the automatic setup to a final Zone Setup unless stopped by clicking the **Pause** button. (You can click the Pause button to avoid contaminating the process if traffic slows down momentarily or there is a large gap in the traffic flow.)

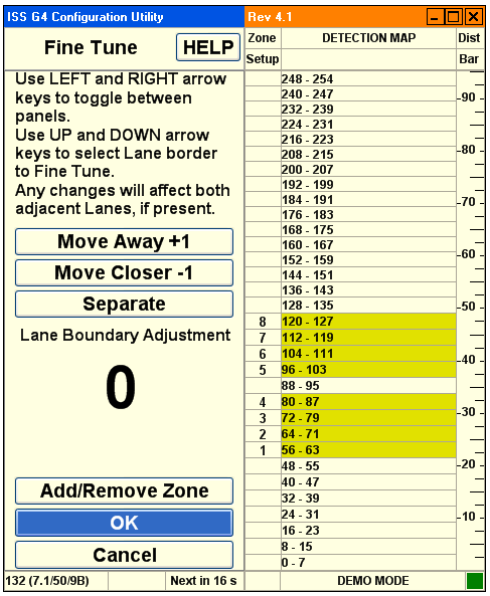
On completion, the final positions of the detection zones will be displayed.

Watch the vehicle icons on the right side of the screen and look for possible "Splashing" of vehicles in one lane into another adjacent lane also. (Trucks are responsible for most "splashing".)

How to Fix Splashing

Splashing occurs when a vehicle from one lane triggers a detection in another lane. Lane changes are one cause of splashing. Narrow lanes or incorrect boundaries are other common causes.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Zones** from the listed options.
4. Select **Fine Tune** from the listed options.

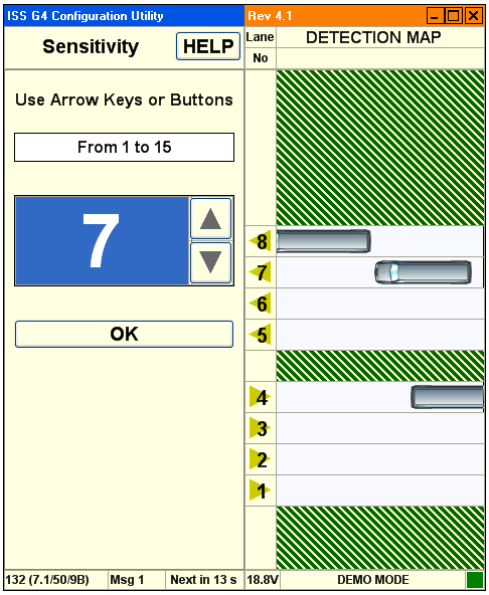


5. To fix splashing, select a Zone No. and boundary between zones by using left click or **SPACE**.
6. Use the **Move Away** and **Move Closer** buttons to change the boundary by a single micro slice at a time. Observe the effect on detection on the Fine Tune or Manual Setup Screen.
   - The boundary move affects the zones on either side, reducing one and enlarging the other.
   - A panel counter shows the amount of shift at any time. This counter resets when you select the next boundary.
   - By selecting **Add/Remove Zone** button you can change the number of zones and create wider zones spanning more than one lane.
   - The same two mechanisms allow you to perform the entire zone setup process manually, by adding zones and moving their boundaries manually.

How to Adjust Sensitivity

Sensitivity adjustments are necessary to detect small vehicles or to reduce sensitivity (and prevent errors from over-sampling).

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Sensitivity** from the listed options.

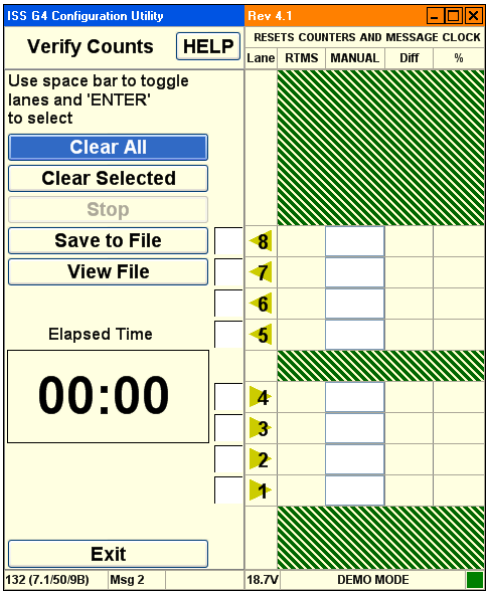


- Increase sensitivity (if needed) to detect small vehicles.
- Reduce sensitivity if the button turns red. (Sensitivity is too high.)
- Adjust sensor aim if small vehicles in close or far lanes are missed. Tilt the sensor towards the zones with poor detection.
- Do not increase sensitivity to compensate for improper aiming.

How to Verify Counts

The verification of a good zone setup is an essential part of the setup. In it we compare RTMS volume measurements over a period of time to a manual (visual) count for the same interval. Use of a hand-held tally counter is recommended.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Verify** from the listed options.

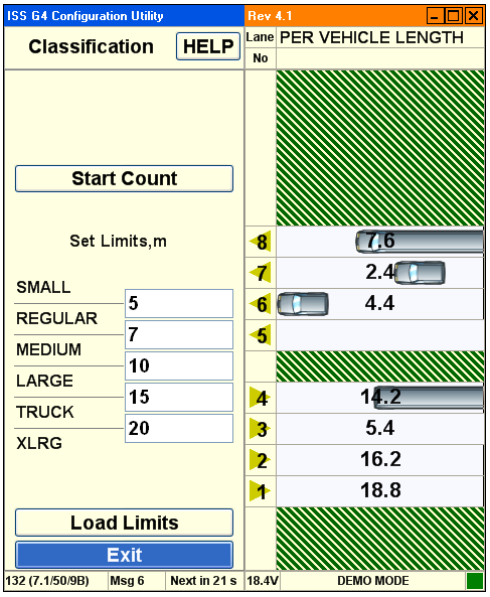


4. Select which lanes you wish to verify by checking their adjacent boxes. Unchecked lanes will remain unchanged.
5. Clear the checked RTMS data counters by clicking the **Clear Selected** button or by clicking **Clear All**.
6. In the selected lanes, count vehicles as they cross the RTMS beam starting immediately after hitting the **Start** button.
7. Several observers may be enlisted in the process, with each observer counting traffic in a different lane. The RTMS Count for each selected lane (zone) will be updated as vehicles pass.
8. Continue counting until each lane has a count of about 50 vehicles; this will usually take several minutes. An **Elapsed Time** counter shows you the interval.
9. Click the **STOP** button when there is a gap in the traffic and immediately stop your manual counting on all lanes.
10. Highlight a **Manual Count** box and enter the manual count for the zone in the corresponding box.
11. The difference between the RTMS and the manual counts in absolute and percent deviation terms is immediately displayed. Deviation of more than 5% requires zone setup correction to improve detection accuracy. The verification process should then be repeated.
12. To save the accumulated results of verification in a text file, click **Save to File**. Use normal Windows procedures to name and save the file using the Save As dialog box. Similarly click **View File** to be shown verification results previously saved.

How to Modify Vehicle Classifications

The correct classification of vehicles by length requires good breakpoints.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Advanced** from the listed options.
4. Select **Classification** from the listed options.

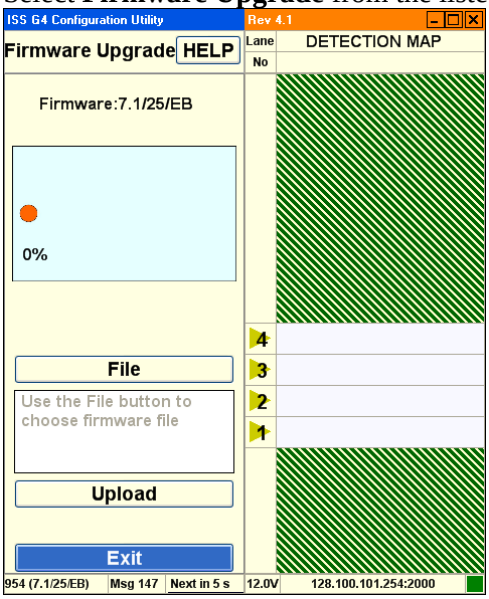


- The Classification screen allows the editing of the five predefined length breakpoints above Small vehicle: Reg, Med, Large, Truck and XLong.
- For best results, ensure that differences between length breakpoints are greater than 3m (10 ft.) especially for larger vehicles. Small separation values increase potential for "merging" of classes (vehicle counting errors are the result).
- To check the correctness of the breakpoints, start the per vehicle class counter and compare the accumulated per vehicle classification counts to manual counts for a period of at least one minute at a time.
- To select the number of classes, go to Message Composition in Manual Setup.

How to Upgrade Firmware

Complete the following procedure to upgrade firmware.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Advanced** from the listed options.
4. Select **Firmware Upgrade** from the listed options.



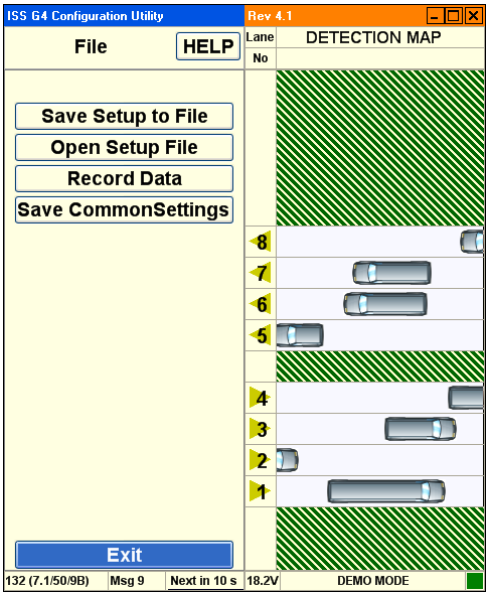
5. Ensure that current firmware version is displayed on screen.
6. Proceed to select the firmware file to upload into the RTMS. During upgrade, the progress bar advances and indicates Percentage Complete. Retries may occur with poor or intermittent communication.

   Retries may occur.
7. Wait for the message **Upgrade Succeeded**.

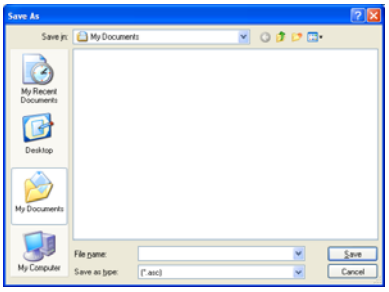
How to Record Data

WinRTMS can record RTMS statistical data to a file on the PC's hard disk.

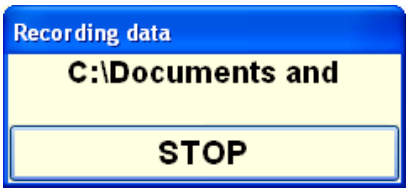
1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **File** from the listed options.



4. Select **Record Data** from the listed options.
5. The software prompts you to choose a filename and location on the hard disk. The data file will have extension .asc.

6. 

The software displays a dialog that allows you to stop recording.



7. Click **Stop** when you are finished.

X3 Compatible—Statistical Message

The X3 message format will always display all 8 zones even if not configured in the setup. The file also provides a voltage reading and a diagnostic indicator in every message.

Figure 3.3 **A sample X3 STAT file with 6 length classes reporting.**

```
 RTMS STAT. MESSAGES   ZONE:   1   2   3   4   5   6   7   8
 SPEED IN MPH.  Occupancy 6 ft loop normalized.

10 04 2007 15:03:17
MESSAGE NO. 78        VOLUME:   2   3   9   4   0   0   0   0
                  MID SIZE 1:   0   0   2   0   0   0   0   0
                  MID SIZE 2:   1   0   0   0   0   0   0   0
                    LONG VEH:   0   0   0   0   0   0   0   0
                  LONG VEH 2:   0   0   0   0   0   0   0   0
                   XLONG VEH:   0   0   0   0   0   0   0   0
STATION ID. 1      OCCUPANCY:   2   1   5   2   0   0   0   0
FWDLK SPEED ?   SIDEFRD SPD:   57  57  62  66  ?   ?   ?   ?              Dir. 0 V. 250 H. 48

10 04 2007 15:03:47
MESSAGE NO. 79        VOLUME:   0   3   11  12  0   0   0   0
                  MID SIZE 1:   0   0   0   1   0   0   0   0
                  MID SIZE 2:   0   0   0   0   0   0   0   0
                    LONG VEH:   0   0   0   0   0   0   0   0
                  LONG VEH 2:   0   0   0   0   0   0   0   0
                   XLONG VEH:   0   0   0   0   0   0   0   0
STATION ID. 1      OCCUPANCY:   0   1   5   6   0   0   0   0
FWDLK SPEED ?   SIDEFRD SPD:   ?   58  62  73  ?   ?   ?   ?              Dir. 0 V. 249 H. 48
```

G4 Statistical Message

Figure 3.4 **Sample G4 STAT file with all 12 lanes and 6 length classes reporting.**

```
| RTMS STAT. MESSAGES   ZONE:   1    2    3    4    5    6    7    8    9    10   11   12
  SPEED IN Km/h.

10 07 2008 14:59:04
MESSAGE NO. 250       VOLUME:   8    8    11   7    20   10   12   14   9    11   13   11
                         REG:   2    0    0    0    1    1    1    1    1    1    3    1
                         MED:   0    0    1    0    1    2    0    0    0    1    1    1
                       LARGE:   0    1    0    0    0    0    1    0    0    0    2    2
                       TRUCK:   0    0    0    0    0    1    0    2    0    1    0    0
                       XLONG:   0    0    2    0    0    0    0    0    0    0    2    0
STATION ID. 2      OCCUPANCY:   5.6  5.1  12.4 4.4  17.5 11.5 9.3  13.0 6.3  8.7  16.6 10.0
FWDLK SPEED 0   SIDEFRD SPD:   85   105  98   93   79   92   89   102  77   106  102  100   Dir. 0 V. 233 H. 0

10 07 2008 14:59:34
MESSAGE NO. 251       VOLUME:   10   11   18   15   8    12   14   18   8    15   14   13
                         REG:   1    0    0    1    0    2    1    3    0    2    2    1
                         MED:   0    1    0    1    0    1    1    1    1    2    3    2
                       LARGE:   0    0    0    1    0    1    2    1    0    2    0    0
                       TRUCK:   0    0    0    1    0    0    2    0    0    1    0    0
                       XLONG:   1    0    0    0    0    1    0    0    0    0    1    0
STATION ID. 2      OCCUPANCY:   8.4  6.6  9.4  14.8 5.4  14.2 16.3 14.8 6.8  14.8 13.9 8.1
FWDLK SPEED 0   SIDEFRD SPD:   91   104  105  89   81   89   97   101  77   105  97   102   Dir. 0 V. 233 H. 0
```

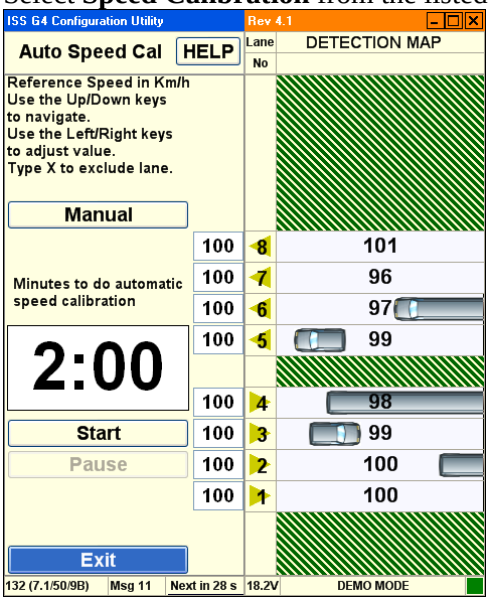
Please note:

- G4 Statistics Message will have a variable length based on how many lanes are configured.
- The designation of vehicle classes will also be the same as shown in the WinRTMS utility.
- If **Per Vehicle** is **ON**, their data will be ahead of each message period statistics.

How to Perform Automatic Speed Calibration

Automatic Speed Calibration is intended for use with higher-volume traffic, flowing at stable speeds.

1. Start the WinRTMS software.
2. Select **Speed Calibration** from the listed options.



3. Use the Up/Down arrow keys to highlight the per-lane Reference Speeds.

   The Left/Right arrow keys will decrease or increase the reference in 2 MPH / Km/h increments, which may be estimated or measured (For example: using a radar gun).
4. Click the **Time Indicator** and increase or decrease the calibration time with the Right and Left arrow keys. A minimum of 2 minutes is required, although 3 to 5 minutes is best, depending on traffic volume. The internal speed coefficients will not update if traffic is too light.
5. Click the **Start** button and wait as the lane speeds change from their current level towards the Reference Speeds.
6. You can click the **Pause** button to avoid contaminating the process if traffic slows down momentarily or there is a large gap in the traffic flow. You can then **Resume**. This is particularly handy when calibrating mid-block applications. You can also change the Reference Speed during calibration, only if more than 2 minutes are remaining. If after sufficient time the difference to the reference speed is still more than 10%, manual adjustment may be necessary.
7. Click on **Manual** if necessary.
8. Click **Exit** when you are finished.

How to Perform Manual Calibration

Manual Speed Calibration is intended for very low-volume traffic (For example: traffic volume of less than 5 vehicles per minute).

Note

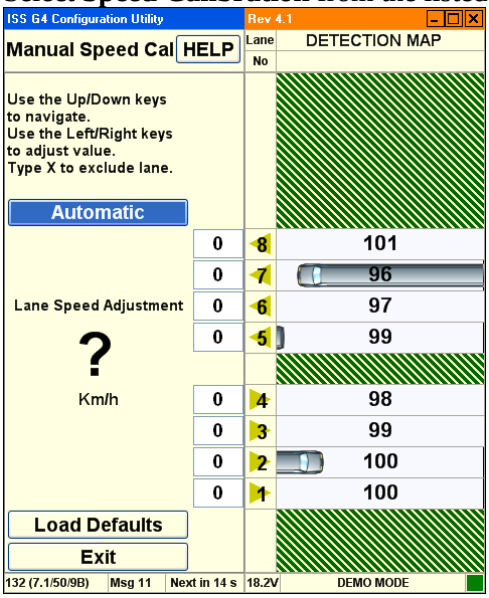
To adjust the speeds after Automatic Speed Calibration, DO NOT Load Defaults.

- ONLY Increase or decrease zone speeds as necessary
- It is always best to use Auto Speed Calibration first.

If Not:

- You can Load Default parameters and then observe the actual reported average speed per lane.
- Compare the displayed speed measurement to your estimated average speed in each lane.

1. Start the WinRTMS software.
2. Select **Speed Calibration** from the listed options.



3. Use Up/Down, Left/Right arrow keys to select a zone and adjust up or down in 2 MPH or Km/h increments; as an example, if speed readings are 10 MPH too low, increase that lane's speed by 10. The new coefficients take effect immediately.

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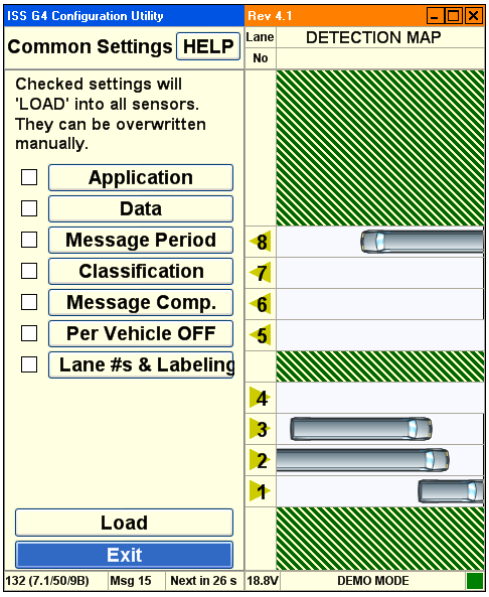
How to Configure Common Settings

Setup Parameters are often common to all sensors. For example, the sensors in a mid-block deployment or string of detection stations along the same highway. To save the installer time and effort in repeatedly entering the same parameters in each site, a group of settings is defined as common settings. Common settings allow you to specify the basic parameters for an entire group of sensors

1. Start the WinRTMS software.
2. Select **Common Settings** from the listed options.
3. The common settings screen appears:



4. Check the boxes on the sides of the displayed parameters to define which parameters are defined as common settings.
5. Click **Load** to send the common parameters to the RTMS sensor.
6. Click **Exit** to return to the main screen.

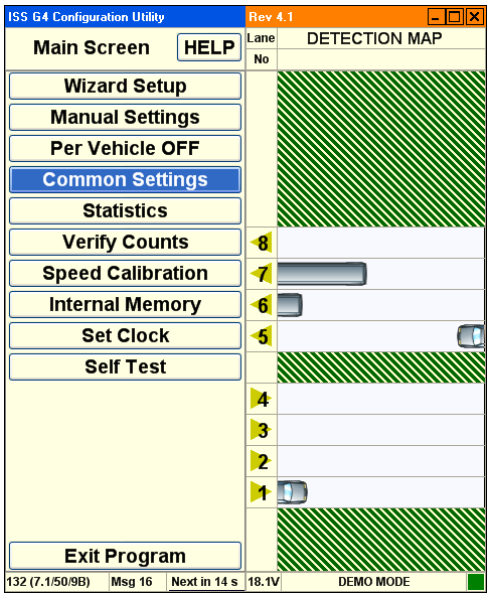
How to Save a Setup File to the Hard Disk

1. Start the WinRTMS software.
2. Select **Manual Settings**.
3. Select **File**.
4. Select **Save Setup To File** and follow standard Windows procedures to save the setup parameters.

RTMS Workspace

The RTMS workspace is vertically divided into two separate panels. The title bar runs horizontally across the top of the workspace. The status bar runs horizontally across the bottom of the workspace.

Figure 3.5. RTMS Workspace



- **WinRTMS Setup Utility**. This contains a variety of controls used to configure the WinRTMS detector functions.
- **WinRTMS Detection Map**. This contains controls that display the active traffic visualization.

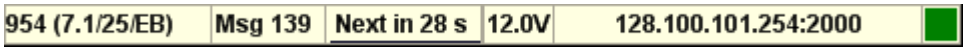
RTMS Title Bar

The WinRTMS title bar provides basic application size and position controls.

- **Reposition**. Left click and drag the title bar to reposition the entire workspace.
- **Minimize**. Left click the minimize button to maximize the workspace.
- **Maximize**. Left click the maximize button to maximize the workspace.
- **Exit**. Left click the exit button to close the software. You will be prompted to save the file if the file is unsaved or to save changes if the file has been modified.

RTMS Status Bar

The WinRTMS status bar provides information about the current mode and traffic detection parameters.



Options are:

- The Serial Number and firmware version of the RTMS.
- The number of the currently received statistical message.
- The countdown timer (in seconds) to the next statistical message.
- The current input voltage reading.
- The active Communications port and its speed or the current IP address.
- The Communications indicator flashes every time there is communication.

About RTMS Main Screen

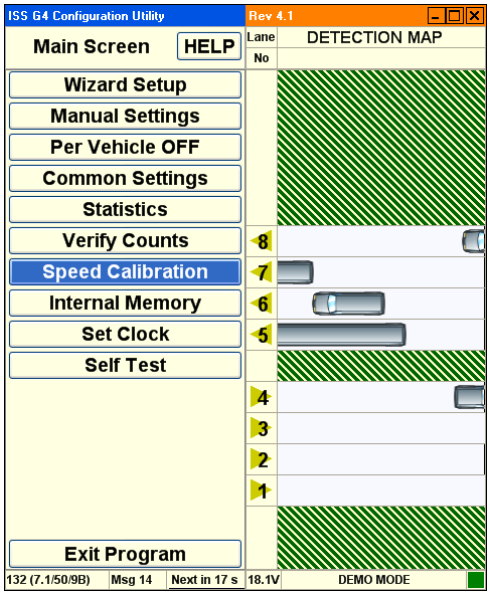
The RTMS main screen is displayed when you load an existing project or when you complete the RTMS Wizard setup process.

Note If WinRTMS determines that the RTMS is of earlier firmware revision than 7.1, it will automatically launch WinRTMS version 3.6. Please refer to RTMS User Manual Issue 4.0 for this setup and operation.

Once communication with the RTMS is established, the Main Screen appears. The RTMS is now ready to be calibrated.

- The left panel consists of a list of function buttons.
- The right panel displays the detection map with the current detection zones and real time detections indicated by moving vehicle icons.
- Options you can click are displayed inside buttons.
- Plain text, such as **Main Screen** and **Detection Map** are used to indicate the current screen.
- You cannot click these text descriptions.
- Always click buttons to change the screen or modify settings.
- **The Factory setting may not show zones and/or vehicles**.

RTMS Main Screen

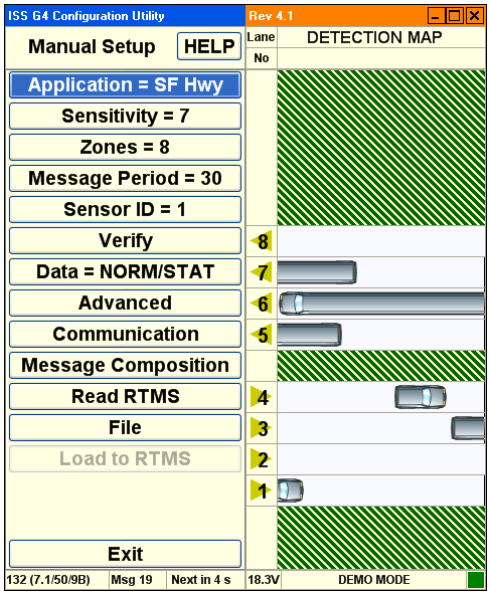


Options are:

- **Help**. Displays in the right panel help for the current screen.
- **Wizard Setup**. Starts the wizard setup process.
- **Manual Settings**. Displays the manual setup screen.
- **Per Vehicle OFF**. Turning On per vehicle adds the Time stamp, Lane Number, Classification, Speed and Dwell Time of every vehicle in real time. This added information can create a huge file in a short time if saving Statistical information to memory. It will also stream per vehicle information when Data Mode is set to Stat, and you expect to receive data only every Message Period.
- **Common Settings**. Displays the common settings screen.
- **Statistics**. Displays the statistic screen.
- **Verify Counts**. Displays the verify counts screen.
- **Speed Calibration**. Displays the speed calibration screen.
- **Internal Memory**. Displays the internal memory screen.
- **Set Clock**. Synchronizes the RTMS clock with your computer clock.
- **Self Test**. Displays the self test screen.
- **Exit**. Closes the software. You will be prompted to save the file if the file is unsaved or to save changes if the file has been modified.

RTMS Manual Setup

The WinRTMS manual setup screen displays options that allow you to manually configure the software.



Options are:

- **Application**. This option displays a list of different sensing modes such a side-fired, intersection, and overhead highway. Select the mode that best matches your hardware configuration and detection requirements.
- **Sensitivity**. This option displays sensitivity adjustment parameters used to calibrate the sensitivity for a variety of vehicle sizes and sensing applications.
- **Zones**. This option allows you to alter lane number and other related parameters such as splash and labeling.
- **Message Period**. This option allows you to configure the message period for which statistical reports are generated.
- **Sensor ID**. This option allows you to set the **Sensor ID** parameter.
- **Verify**. This option allows you to manually verify traffic count results and determine the error percent.
- **Data**. This option allows you to control the basic data mode for a single RTMS device or for a collection of RTMS devices.
- **Advanced**. This option accesses advanced features such as traffic classification options and firmware upgrade management.
- **Communication**. This option allows you to specify communication parameters such as **Port** and **Baud Rate**.
- **Message Composition**. This option allows you to configure the content and format of each statistical message.
- **Read RTMS**. This option transfers the current setup parameters from the RTMS sensor to the software.
- **File**. This option allows you to save and load configuration files.

- **Load To RTMS**. Clicking this button loads the current configuration (running on the WinRTMS software) to the RTMS.
- **Exit**. Returns to the main screen.

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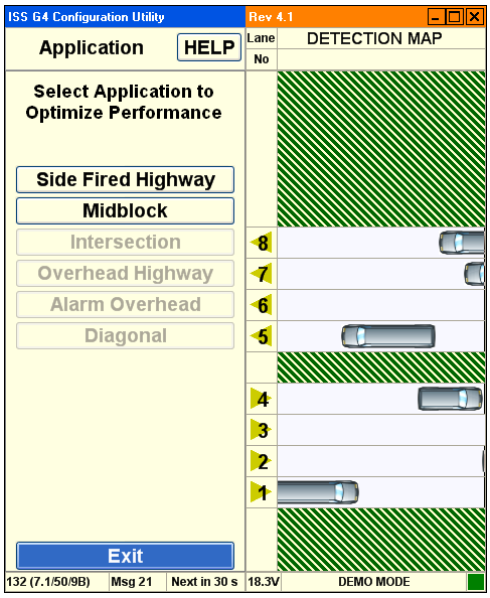
RTMS Application Options

This screen displays a list of different sensing modes such a side-fired, intersection, and overhead highway. Select the mode that best matches your hardware configuration and detection requirements.

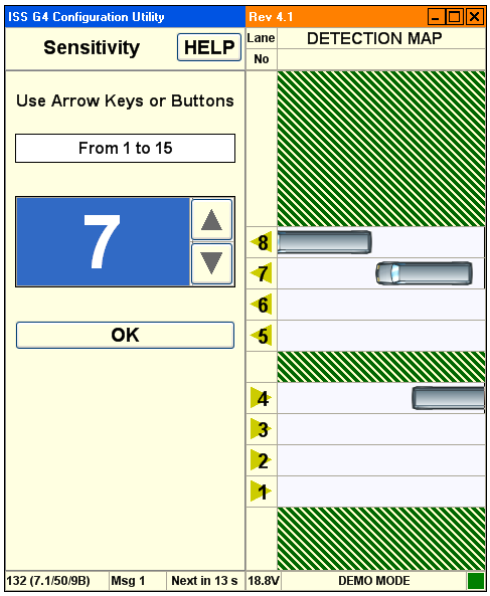


Options are:

- **Side Fired Highway**. The RTMS detects presence and generates traffic data in up to 12 zones. (Use this option for highway and counting applications where traffic is generally moving.)
- **Mid-Block**. Similar to Side Fired Highway mode. Use this option for urban areas where traffic is generally moving but gets congested.
- **Intersection**. The RTMS detects presence only in multiple zones. (No traffic data is generated) Use this option for Stop-bar detection where traffic is generally stopped.
- **Overhead Highway**. The RTMS provides very high presence and per vehicle Doppler speed accuracy. Volume data in up to 7 speed bins is available. Use this option for per vehicle speed, speed Enforcement, or red light enforcement.
- **Alarm Overhead**. Similar to **Overhead Highway** with programmable Speed Threshold and real time contact closure when a vehicle exceeds threshold. Use this option for speed enforcement and warning applications.
- **Diagonal**. The RTMS can cover multiple lanes and provide accurate per vehicle speed. Use this option for photo radar and speed/warning applications.
- **Exit**. Returns to the main screen.

RTMS Sensitivity Options

This option displays sensitivity adjustment parameters used to calibrate the sensitivity for a variety of vehicle sizes and sensing applications.

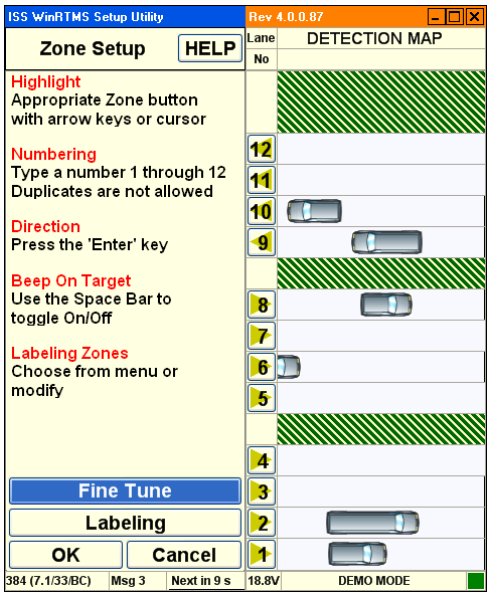


Options are:

- **Arrows**. Click **UP** and **DOWN** arrows on screen or use arrow keys to set **Sensitivity** to **7** initially. Learn how to adjust sensitivity.
- **OK**. Activates the new value and returns to the main screen.

RTMS Zone Options

This screen allows you to alter lane number and other related parameters such as beeping and traffic direction. See How to Fix Splashing.

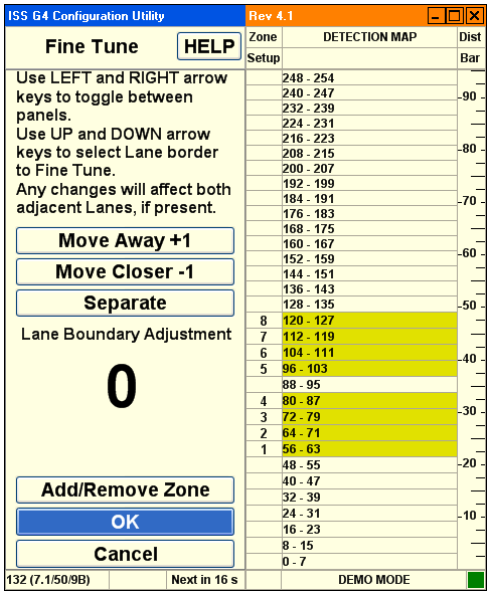


Options are:

- **Lane Numbers**. A list of lane numbers is displayed.
  - Once a Lane Number is selected (highlighted), you can:
    - Re-number the lanes.
    - Change vehicle icon direction
    - Turn on a Beep upon detection in that lane (Zone).
    - This is an additional aid in verifying that vehicles you see on the road are detected properly by the RTMS and reported in the correct Zones.
- **Fine Tune**. If you observe "Splashing" where a single vehicle also shows detection in an adjacent zone or if vehicles are shown in the wrong lane, this may indicate that the zone boundary positions do not line up with the lanes. Make sure that the splashing was not caused by a vehicle changing lanes before using the **Fine Tune** option.
- **Labeling**. Rename lanes with this option.
- **OK**. Saves changes and returns to the main screen.
- **Cancel**. Returns to the main screen without saving changes.

RTMS Fine Tune Options

This screen allows you to fine tune zone boundary parameters.

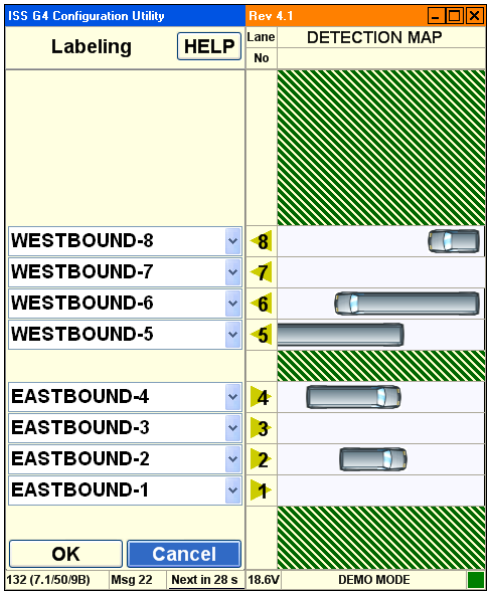


Options are:

- **Move Away +1**. Increases lane boundaries to more closely match the actual lanes.
- **Move Closer -1**. Decreases lane boundaries to more closely match the actual lanes.
- **Separate**. Inserts a space between lanes (for medians, curbs).
- **Layer Boundary Adjustment**. Displays the amount of adjustment made for the current iteration. For example: 4.
- **Add/Remove Zone**. Adds a new lane or removes an existing lane.
- **OK**. Saves changes and returns to the main screen.
- **Cancel**. Returns to the main screen without saving changes.

RTMS Labeling Options

This screen allows you to customize zone names. (The labeling is stored within the RTMS sensor and is not transmitted in the statistical message.)

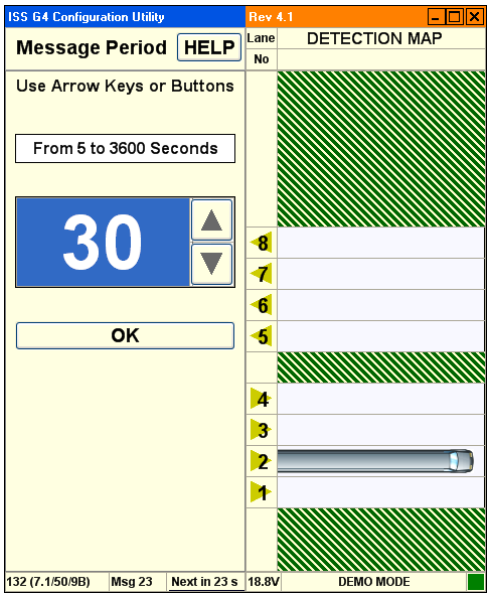


Options are:

- ***Lane Name***. Type a new name for the indicated lane.
- **OK**. Saves changes and returns to the main screen.
- **Cancel**. Returns to the main screen without saving changes.

RTMS Message Period Options

This screen allows you to configure the message period for which statistical reports are generated. A 30 second message period is generally used for Real-Time traffic data and 300 to 900 sec (5 to 15 min) for counting applications.



Options are:

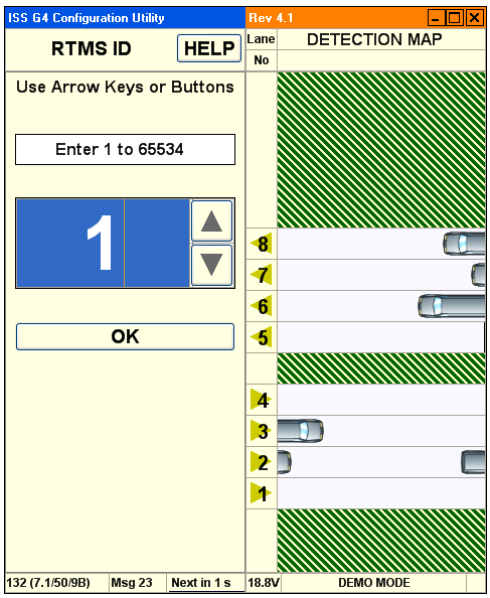
- **Arrows**. Click **UP** and **DOWN** arrows on screen or use arrow keys to set **Message Period** to the desired interval.
- **OK**. Activates the new value and returns to the main screen.

RTMS Sensor ID Options

This screen allows you to set the **Sensor ID** parameter. (Please consult ISS Canada for assistance designing large serial networks.)

- **X3 Stat Mode**. The Sensor ID range is between 1-254.
- **G4 Mode**. The Sensor ID range is between 1-65534.

The Sensor ID must be set only if Polled data mode is used. Units should be assigned unique ID numbers to avoid data corruption.

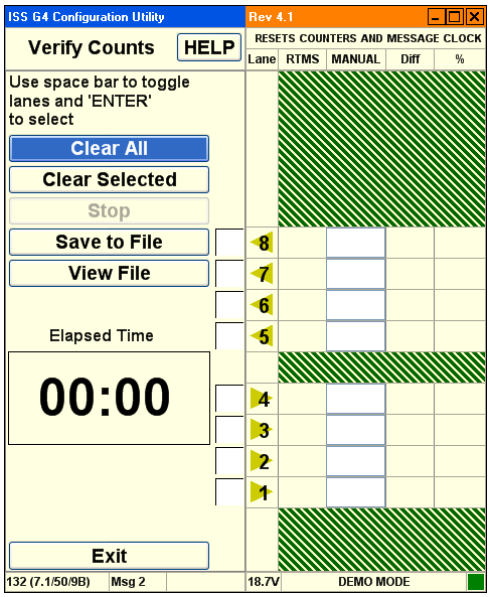


Options are:

- **Text Entry**. Use the keyboard to type an integer and the **Sensor ID** to the desired value.
- **Arrows**. Click **UP** and **DOWN** arrows on screen or use arrow keys to set **Sensor ID** to the desired value.
- **OK**. Activates the new value and returns to the main screen.

RTMS Verify Counts

The verification of a good zone setup is an essential part of the setup. In it we compare RTMS volume measurements over a period of time to a manual (visual) count for the same interval. Use of a hand-held tally counter is recommended. See How To Verify Counts.

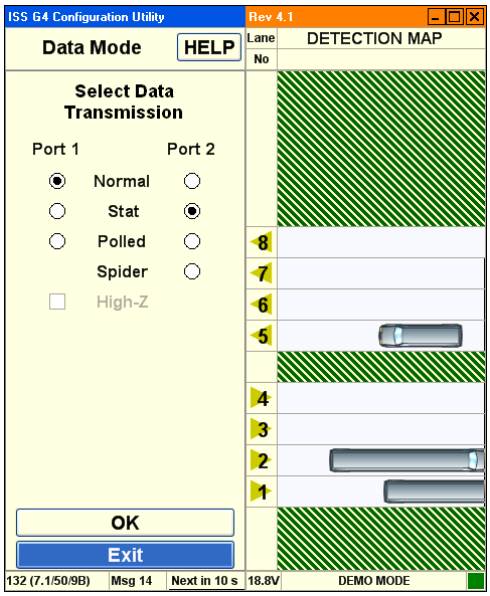


Options are:

- **Clear All**. This option clears the current values from all the traffic lanes.
- **Clear Selected**. This option clears the current values from the selected traffic lanes.
- **Stop**. This option terminates the counting process.
- **Save To File**. This option allows you to save a count file to the hard disk.
- **View File**. This option allows you to load a count file from the hard disk for review.
- **Elapsed Time**. This option displays the amount of time since count verification started.
- **Exit**. Returns to the main screen.

RTMS Data Options

The Data Mode determines whether data is Pushed or Pulled from the RTMS unit.

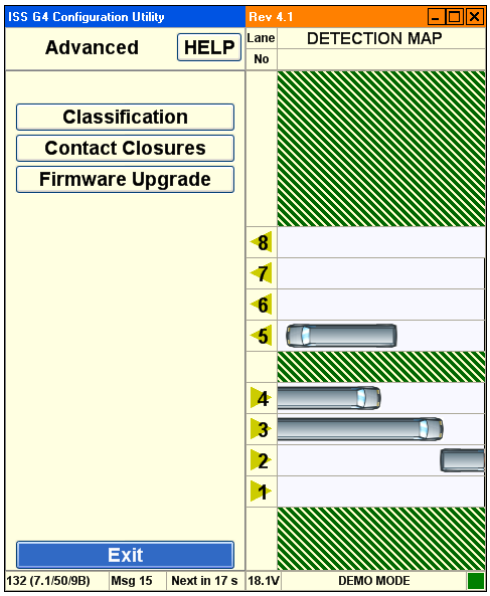


Options are:

- **Normal**. Normal mode sends statistic messages at the end of every Message Period and all per vehicle information to display vehicle icons, speeds etc.
- **Stat**. Stat mode allows only the statistical messages to be sent at the end of every Message Period.
- **Polled**. Polled mode only allows the RTMS to send statistical data, in its buffer, in response to the specific Sensor ID request from an outside source.
- **Spider**. Spider mode configures the RTMS to send data, via the SPIDER protocol, through port 2. This option only works with SPIDER systems.
- **High-Z**. This option leaves the transmit pin in high-impedance (or tri-state) mode. This is only available in **Polled** mode.

RTMS Advanced Options

This screen accesses advanced features such as traffic classification options and firmware upgrade management.

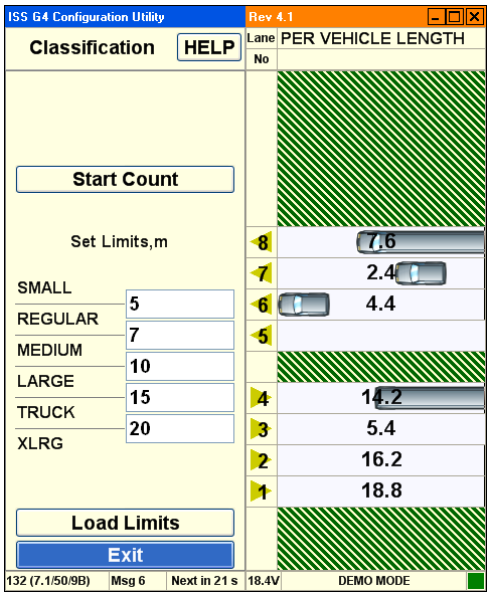


Options are:

- **Classification**. This option allows you to modify traffic classification options.
- **Contact Closure**s. This option allows you to implement real time presence indication in each detection zone.
- **Firmware Upgrade**. This option allows you to upgrade to the latest version of ISS Canada firmware.

RTMS Advanced Classification Options

This screen allows you to alter traffic classification options and count (length) the number of vehicles of each type detected in the monitoring period.

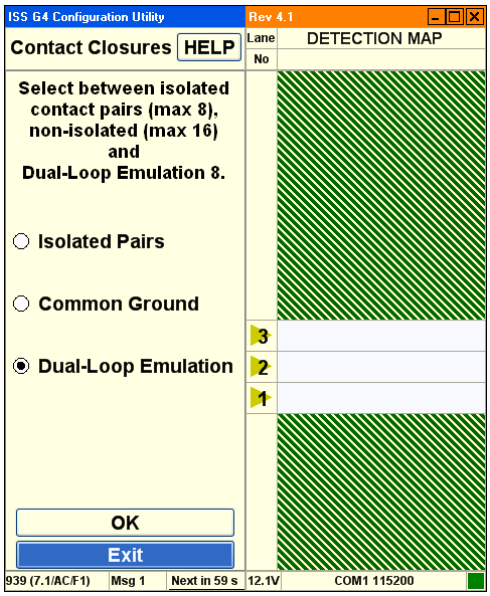


Options are:

- **Start Count**. This option starts the count, displaying the number of vehicles of each type that are detected.
- **Set Limits**. These options allow you to set the maximum length for a category of vehicles.
  - Depending on the number of classifications selected in Message Composition, either 2, 4 or 6 classes will display.
  - The number between the two classes (example between Small and Regular) reflects the break point between the 2 classes.
- **Load Limits**. This option sends the current size parameters to the RTMS sensor.
- **Exit**. Returns to the main screen.

RTMS Contact Closures

This screen allows you to select or configure the type of contact closure to be used.

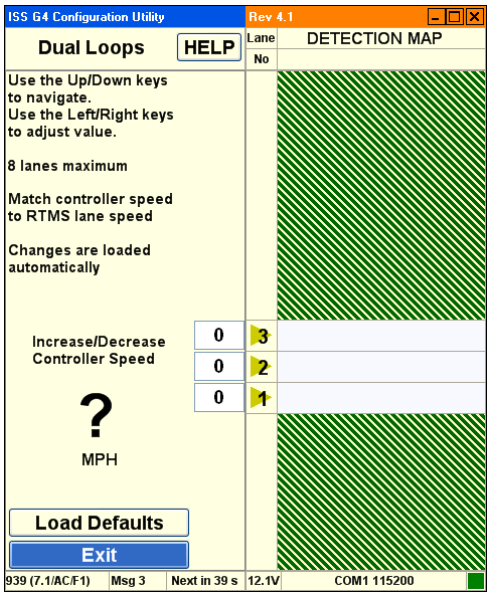


Options are:

- **Isolated Pairs**. This option allows you to isolate contacts from each other.
- **Common Ground**. This option allows contacts to share a common ground.
- **Dual-Loop Emulation**. Double click the "text" to configure dual loop detection parameters.

RTMS Dual Loop Options

This screen allows you to adjust the controller speed output to match the RTMS speed.

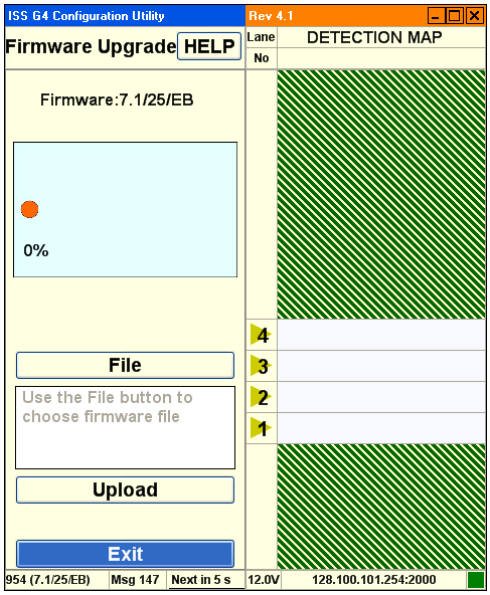


Options are:

- **Increase/Decrease Controller Speed**. This option allows you to synchronize average vehicle speed at the controller with average vehicle speed at the RTMS sensor.
- **Load Defaults**. Loads factory default settings for speed coefficients.
- **Exit**. Returns to the contact closures screen.

RTMS Firmware Upgrade Options

This screen allows you to upgrade firmware.



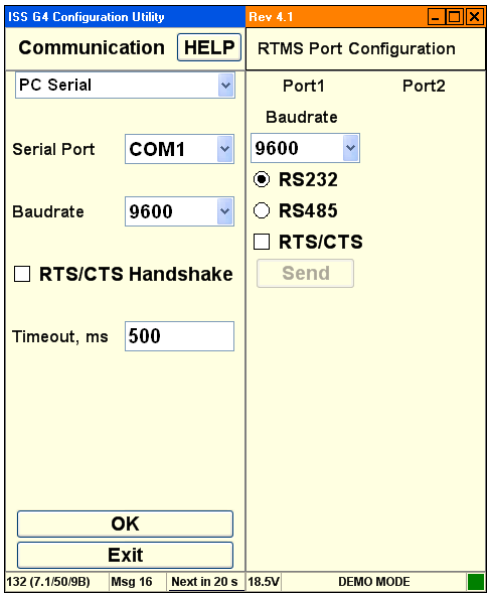
Options are:

- **Progress / Message Indicator**. Displays current progress and status messages.
- **File**. This option allows you to specify a new firmware file.
- **Upload**. This uploads the firmware file to the sensor.
- **Exit**. Returns to the previous screen.

RTMS Communication Options

This screen allows you to configure communication protocols and specific parameters.

PC Serial Communication Options



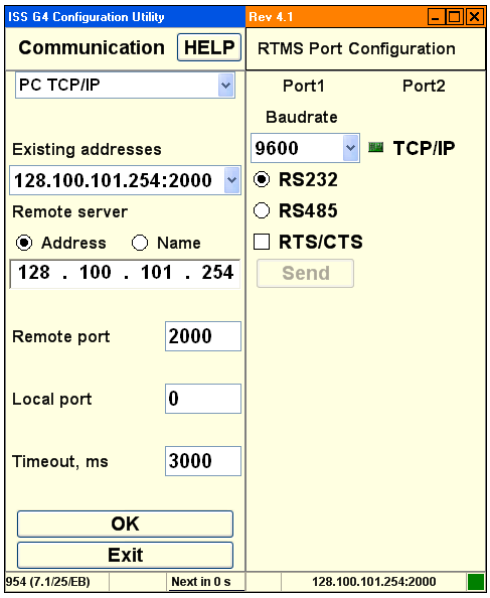
Options are:

- **Mode**. This drop-down allows to you to select the communication mode. Options are:
  - PC Serial. This option selects PC Serial communication.
  - TCP/IP. This option selects TCP/IP communication.
  - Radio Modem. This option selects radio modem communication.
- **Baud Rate**. This drop-down allows to you to select the baud rate in Bits Per Second. Available baud rates differ by connection mode.
- **RTS/CTS**. This enables handshake functionality between two modems.
- **Timeout, ms**. This option allows you to specify the timeout period. If communication is not established during this timeout period, the software returns to this screen and allows you to try again.
- **Port 1**. Allows you to specify communication parameters for Port 1.
  - Baud Rate. This drop-down allows to you to select the baud rate in Bits Per Second.
  - RS232. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
  - RS485. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
  - RTS/CTS Handshake. This uses handshake functionality between the PC and RTMS.
- **Send**. Sends the communication parameters to the RTMS sensor.

RTMS Communication Options…

This screen allows you to configure communication protocols and specific parameters.

PC TCP/IP Communication Options



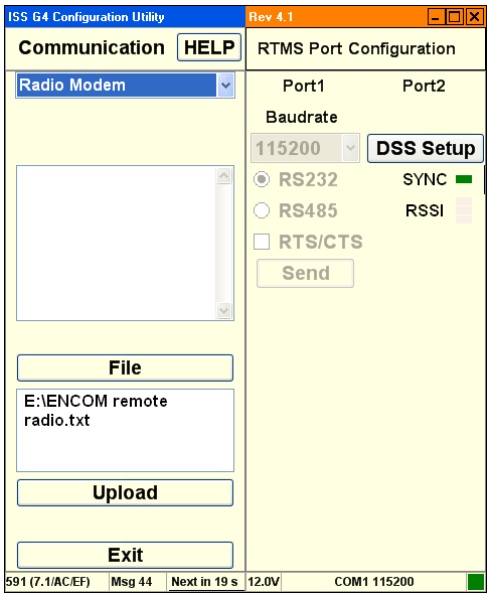
Options are:

- **Mode**. This drop-down allows to you to select the communication mode. Options are:
  - PC Serial. This option selects PC Serial communication.
  - TCP/IP. This option selects TCP/IP communication.
  - Radio Modem. This option selects radio modem communication.
- **Existing Addresses**. Provides a list of previous IP addresses.
- **Remote Server**. Allows you to specify the name of the remote server by IP address or name.
- **Remote Port**. Allows you to specify the address of the remote port.
- **Local Port**. Allows you to specify the address of the local port.
- **Timeout, ms**. This option allows you to specify the timeout period. If communication is not established during this timeout period, the software returns to this screen and allows you to try again.
- **Port 1**. Allows you to specify communication parameters for Port 1.
  - Baud Rate. This drop-down allows to you to select the baud rate in Bits Per Second.
  - RS232. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
  - RS485. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
  - RTS/CTS. This enables handshake functionality between two modems.
- **Send**. Sends the communication parameters to the RTMS sensor.
- **TCP/IP**. Indicates that TCP/IP communication is selected.

RTMS Communication Options…

This screen allows you to configure communication protocols and specific parameters.

Radio Modem Communication Options



Options are:

- **Mode**. This drop-down allows to you to select the communication mode. Options are:
  - PC Serial. This option selects PC Serial communication.
  - TCP/IP. This option selects TCP/IP communication.
  - Radio Modem. This option selects radio modem communication.
- **Window**. Displays status messages during configuration. (For example: you might see configuration instructions listed here as the instructions are sent to the mode. Success and failure messages are displayed here.)
- **File**. This option specifies an ASCII file containing modem instructions.
- **Window**. Displays the filename currently used to configure the modem.
- **Upload**. Sends the ASCII file instructions to the modem.
- **Exit**. Returns to the previous screen.
- **Port 1**. Allows you to specify communication parameters for Port 1.
  - Baud Rate. This drop-down allows to you to select the baud rate in Bits Per Second.
  - RS232. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
  - RS485. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
  - **RTS/CTS**. This enables handshake functionality between two modems.
- **Port 2**. Allows you to specify communication parameters for Port 2.
  - DSS Setup. Allows you configure DSS radio communications.

  - Sync. A green light appears when WinRTMS is connected to the sensor via a radio link.
  - RSSI. 1-3 bars indicate radio signal strength.
- **Send**. Sends the communication parameters to the RTMS sensor.

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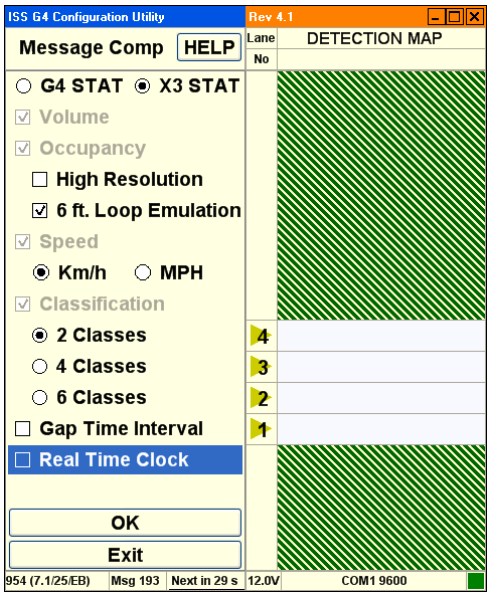
RTMS Message Composition Options

The Message Composition governs the content and format of each statistical message.



Options are:

- **G4 STAT**. Transmit the data using the G4 protocol.
- **X3 STAT**. Transmit the data using the X3 protocol.
- **Volume**. The total number of vehicles per message period.
- **Occupancy**. The percentage of time a lane is occupied by a vehicle within the message period.
  - High Resolution. Uses extra decimal places in the output results.
  - 6 ft. Loop. Adds the loop length to the vehicle length for occupancy calculation.
- **High Resolution**. Uses extra decimal places in the output results.
- **Speed**. Average vehicle speed during the message period. (X3 Stat mode only transmits data in kilometers per hour.)
  - Km/H. Transmits speed data in kilometers per hour.
  - MPH. Transmits speed data in miles per hour.
- **Classification**. The class lengths are set in **Classification Options**.
  - 2 Classes. Determines how many classes to display in the **Classification Options**.
  - 4 Classes. Determines how many classes to display in the **Classification Options**.
  - 6 Classes. Determines how many classes to display in the **Classification Options**.
- **Gap Time Interval**. Gap Time Interval is the average time between vehicles for a Message Period.
- **Real Time Clock**. Event time stamps use the RTMS internal clock when this option is selected.
- **Exit**. Returns to the main screen.

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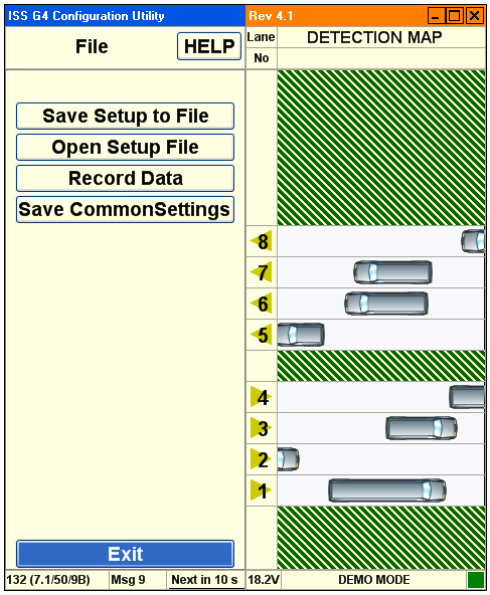
RTMS File Options

The Message Composition governs the content and format of each statistical message.

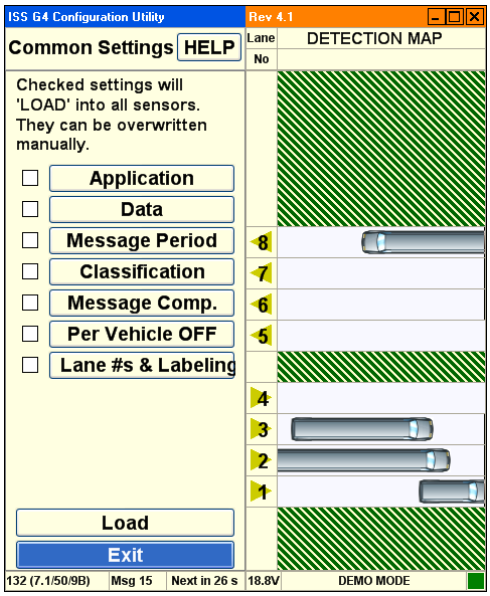


Options are:

- **Save Setup To File**. This option saves the current configuration to a file on the hard disk.
- **Open Setup File**. This option loads a configuration to a file from the hard disk.
- **Record Data**. This option records RTMS statistical data to a file on the PC's hard disk. See How to Record Data.
- **Save Common Settings**. Save all the common configuration settings from your current RTMS setup to the WinRTMS utility. These settings are applied to other RTMS sensors in a single batch.
- **Exit**. Returns to the previous screen.

RTMS Common Settings

The WinRTMS common settings screen displays options that allow you to specify the basic parameters for an entire group of sensors. See also, How to Configure Common Settings.

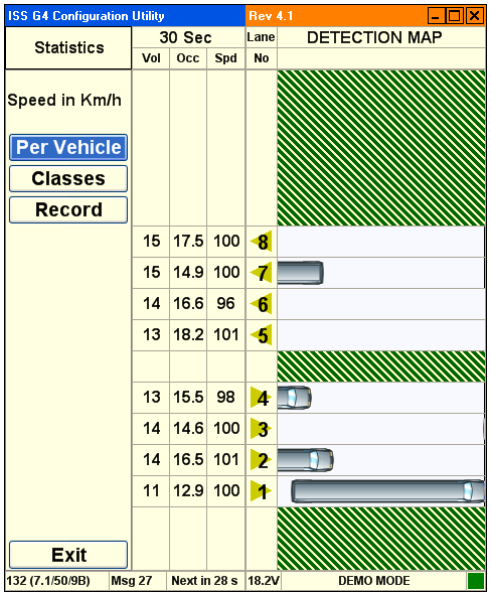


Options are:

- **Application**. Select this option to use common **Application** settings for a group of RTMS sensors.
- **Data**. Select this option to use common **Data** settings for a group of RTMS sensors.
- **Message Period**. Select this option to use common **Message Period** settings for a group of RTMS sensors.
- **Classification**. Select this option to use common **Classification** settings for a group of RTMS sensors.
- **Message Comp**. Select this option to use common **Message Composition** settings for a group of RTMS sensors.
- **Per Vehicle Off**. Select this option to use common **Per Vehicle** settings for a group of RTMS sensors.
- **Lanes Labeling**. Select this option to use common **Lane Numbering** and **Labeling** settings for a group of RTMS sensors.

RTMS Statistics

The WinRTMS statistics screen displays traffic count information including number of cars and average speed. Statistics are displayed only as Volume, Occupancy and Average Speed over the message period as shown.



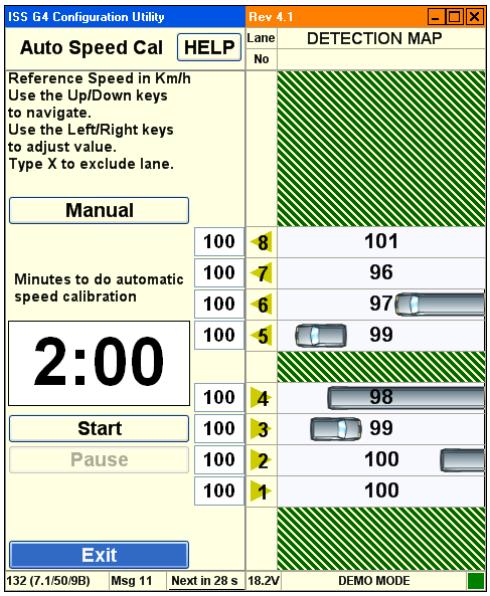
Options are:

- **Per Vehicle**. Provides statistical information for each vehicle as the vehicles are detected.
- **Classes**. Displays the number of vehicles from each class that are detected during the message period.
- **Record**. Records a stream of human-readable ASCII from the RTMS sensor. This data is typically used for troubleshooting.
- **Exit**. Returns to the main screen.
- **{ "30 Sec" Time Elapsed }**. Displays in minutes and seconds the amount of time elapsed in the current monitoring period.
- **Vol**. Displays the total number of vehicles per lane.
- **Occ**. % of lane occupancy for the time period.
- **Spd**. Displays the average speed of traffic in the lane in Km/H or MPH.
- **Lane No**. Displays the lane number.
- **Detection Map**. Displays a real-time visualization of traffic.

RTMS Automatic Speed Calibration

The speed calibration process sets the internal speed coefficients used to calculate the average speed of traffic in each zone. The calibration procedure used depends on traffic conditions.

Note When setting up relocated units at their new locations, all speed coefficients should be first reset to their default values using the Manual Speed Calibration window.

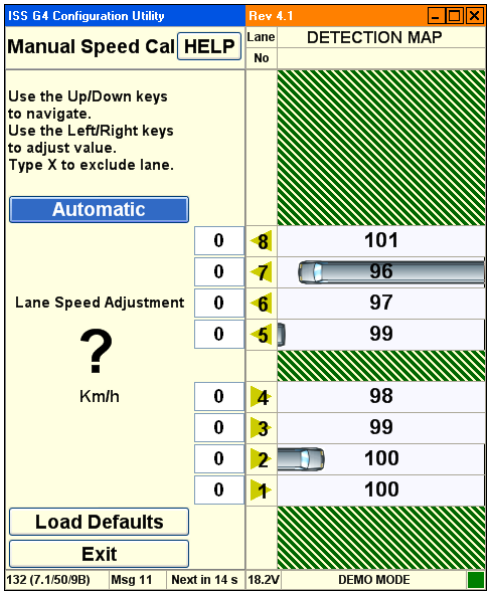


Options are:

- **Manual**. Displays manual calibration options.
- **Start**. Starts the calibration process.
- **Pause**. Pauses the calibration process.
- **Exit**. Returns to the main screen.

RTMS Manual Speed Calibration

The speed calibration process sets the internal speed coefficients used to calculate the average speed of traffic in each zone. The calibration procedure used depends on traffic conditions.



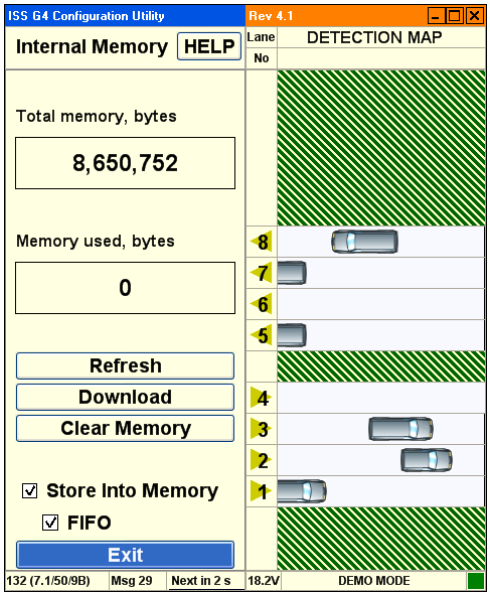
Options are:

- **Automatic**. Displays automatic calibration options.
- **Load Defaults**. Loads the factory default coefficients.
- **Exit**. Returns to the main screen.

RTMS Internal Memory

The RTMS G4 includes an internal memory. Please note:

- Uncheck the **Store Into Memory** option prior to Downloading large volumes of data.
- Download at the highest connection speed available when directly connected to the RTMS sensor. A full memory will take just over 12 minutes to download at 115200 bps.



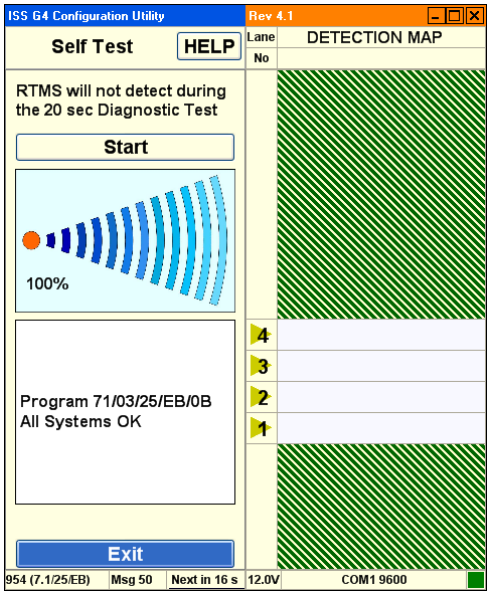
Options are:

- **Refresh**. Updates the Memory Used parameter. Verifies data is being stored.
- **Download**. Downloads the internal memory from the RTMS to the software.
- **Clear Memory**. Clears the memory on the RTMS sensor.
- **Store Into Memory**. This enables storage of RTMS data in the in the RTMS sensor's onboard memory.
- **FIFO**. When memory is full, selecting this option instructs the RTMS to overwrite the earliest stored message.
- **Exit**. Returns to the main screen with saving changes.

RTMS Self Test

The RTMS provides a diagnostic test of its internal functions. The test checks internal functions and locates hardware faults. Please note:

- The **All System OK** message is displayed on the screen if no faults are found.
- The Self-Test will also close the (Optional) zone contacts for one second each in sequence. Operation of the contacts can then be verified using the controller display, ohm-meter or any other suitable device showing continuity.



The following is a list of Self-Test messages describing a fault:

- Power supply fault.
- Power supply fault.
- Modulator signal fault.
- Microwave module fault.
- Modulator memory fault.
- Program memory fault.
- DSP fault.
- Gain too low or ADC fault.
- Logic failure.
- No signal.
- Saturation signal level.